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EXTRACTION OF CATARACT IN THE CAPSULE.

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THE attitude of ophthalmologists outside India towards extraction of cataract in the capsule is fairly represented by Mr. F. Richardson Cross, in a paper read at the British Medical Association meeting—ophthalmic section—at Cheltenham, in 1901, on the treatment of after-cataract, in which he incidentally remarked that "the ideal extraction of a cataract is that of the whole lenticular body in its capsule. But this is only safe under exceptional circumstances"; and this view was tacitly accepted by the meeting.

I have now seen enough of the junior operating ophthalmic surgeons in India, to know that many of them agree with me, not only as to the theoretical excellence of extraction of cataract in the capsule, but also as to its excellence as a practical operation; and that extraction in the capsule should be the operation of election, to which the exceptions would be few. I hope to show that the results are incomparably better in every respect than when the capsule is left behind, as in the ordinary operation. From the number of junior members of the profession who came to me to *see* the operation performed, and who, I know, are practising it, I have reason to hope that in the near future it will become established in northern India as firmly as litholapaxy is established. We have got the same professional opposition to contend with as litholapaxy had in its early days—a class of opposition due to the fact that there are more aspects of practical surgery than the purely scientific one.

The details of the operation which I perform are my own.

My personal experience extends to over 11,000 cataract extractions; of these, about 2000 were performed by the orthodox method of scratching the capsule and leaving it behind; and over 9000 were extractions in the capsule. Those extracted by capsulotomy were, generally speaking, my earlier operations. In them, when a nervous patient was operated on under cocaine, it occasionally happened that, when the incision was made, before there was time to take out the speculum, the patient, by screwing up the orbicularis muscle, put pressure on the eyeball and shot out both the lens in its capsule and a quantity of vitreous. I was agreeably surprised to find that these cases generally turned out well in every way. The observation of this accident and its results induced me to perform extraction in the capsule as a systematic operation, modifying details as experience dictated.

TABLE SHOWING RESULTS OF CASES SUBMITTED TO EXTRACTION IN THE CAPSULE, AT JULLUNDUR CIVIL HOSPITAL, FROM THE 31ST MAY, 1904, TO THE 31ST MAY, 1905.

Numbers.	Iritis.	Escape of Vitreous.	Capsule Bursting.	Capsule Left Behind.	First-Class Results.	Second-Class Results.	Failures.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
2616.	0.3	6.8	8	4.28	99.27	0.38	0.34

Preliminary Inspection of the Eye to be Operated on.—The trained eye of the surgeon, aided only by the fingertips, will supply more information than all the instruments that have yet been devised for this purpose. The patient's eye can be properly inspected only when he is lying on his back, in a good light, from which the direct rays of the sun are excluded. The appearance of the sclerotic, the lustre of the iris, the position of the iris, the position of the lens, and the reaction of the pupil to light will reveal to the naked eye all that is required as far as cataract is concerned, except in the very rarest of circumstances. The reaction of the pupil to light is almost as accurate an indicator of the visual acuteness of the retina as the galvanometer is of an electric current.

In these days of respect for the infallibility of Western teaching and contempt for our powers of observation and capacity for weighing facts in the East, and for our unrivalled experience, it is amusing to meet a man in India who has gone to Europe to have his cataract extracted, who on returning consults us on his after-cataract, and supplies us with the written-out statements by a few of the leading men in Europe on the condition of the eye before it was operated on—laying down, that the cataract was ripe, and that there were slight opacities in the vitreous, and other such things behind an opaque lens. How they can see in through an opaque lens, through which the patient cannot see out farther than to recognize light from darkness, is to me a mystery. "Folk maun do something for their bread, an' sae maun DEATH."

For practical purposes, and having regard only to the operator's point of view, I classify cataracts as follows:

I. In children.

(*a*) Soft—that is, of milky consistency.

(*b*) Gelatinous—that is, of gelatinous consistency.

II. In adults.

(*a*) Hard.

(*b*) Semi-soft—that is, a core surrounded by juice of milky consistency.

(*c*) Semi-gelatinous—that is, a core surrounded by material of grape-juice consistency.

(*d*) Atrophic.

The operator, before he has made his incision, can diagnose each of these varieties with accuracy, hence the importance of the classification. Cataract in children and atrophic cataract are not suitable for extraction in the capsule. In the semi-gelatinous variety, the lens occasionally has a peculiar bluish tinge. These cases also are unsuitable for extraction in the capsule, for the capsule is weak and liable to become ruptured during the operation, allowing the core and lens matter to escape, and if the surgeon be not dextrous it will retract together with some lens matter, so that the ultimate effect on the eye is no better than if the operation had been performed by scratching the capsule.

Out of the 2767 cataracts operated on by me at this hospital during the year, I decided that 151, or 5.4 per cent., were unsuitable for extraction in the capsule; 67 of these were in children and 84 in adults, so that among the adults I excluded about three per cent. from this operation. Having decided that the case is suitable for extraction in the capsule, and the usual preliminaries having been gone through, I make a liberal-sized upper incision, inserting the knife at the sclero-corneal junction, just as deep as anatomy and experience teach us will avoid wounding the dangerous area, and cut out in the cornea with a sweep half-way between a normal pupil and the sclero-corneal junction. I then take out the speculum, and my assistant hooks up the upper eyelid on an ordinary large-sized strabismus hook, and draws down the lower lid by placing the ball of his thumb on the skin of the face, close to the lower eyelid. He lifts the upper lid well up with the strabismus hook, and relaxes his hold on neither the upper nor the lower lid until the operation is finished. It is important that he should lift the upper lid well up and retain the lower one so well down that the orbicularis muscle cannot be brought into action by the patient until the operation is finished. The importance of a thoroughly competent and reliable assistant in this matter cannot be over-estimated. Assuming that the operator is skilled in ophthalmic manipulation, it is the free action of the orbicularis muscle in almost all cases which causes escape of vitreous. I consider it of supreme importance to impress this fact upon any one attempting the operation. I then place the curve of a strabismus hook over the cornea, about the junction of the lower with the middle third of the lens, and a spoon just above the upper lip of the wound. I press the strabismus hook down neither toward the wound nor from it, and do not alter its position until the lens is nearly out, all the time making slow, steady, and uninterrupted pressure and conterpressure. When the lens is more than half-way out I, while keeping up the tension with the spoon in its original position, shift the strabismus hook forward and gently tilt the lens by getting the edge of it in the concavity of the strabismus

hook. If this latter manœuvre be done with the spoon, or other comparatively sharp instrument, or with the slightest roughness or jerk, the capsule will give way and allow the body of the lens to escape, and, if the operator be not dextrous, will itself retract with some contained lens matter, and, being in part dislocated, will give trouble in its removal. I shall deal with the removal of such capsules later on. The lens in its capsule being out, the eyelids are let go and bandaged up with the usual antiseptic pad. If a trace of vitreous has escaped, it is snipped off with scissors, and if the iris prolapses it is replaced before the eyelids are let go. In the case of non-iridectomy extractions, the slow, steady strain of the lens on the pupil tires out the muscle of the iris and the pupil gently relaxes as the muscle tires. There is no advantage in a preliminary instillation of atropine. I have frequently thus extracted the lens in its capsule in opium-eaters, in which the pupil was contracted with opium, without atropine and without difficulty. This slow, steady proceeding also allows time for the lens to become gently dislocated. The operator who attempts to extract the lens in its capsule, either with or without an iridectomy, as rapidly as is done when the capsule is scratched, will have disastrous results. By over-rapid expression the capsule will burst. I find that the whole operation takes from two to three minutes—twenty to thirty cataracts in the hour. The only sponging, washing, or douching I use is a preliminary washing out of the conjunctiva with a 1 in 2000 perchloride of mercury solution. After the lens in its capsule comes out, if we go "fiddling" we are sure to have an escape of vitreous. The lids on closing are quite sufficient to drive out any fluid there may be, vitreous or other, except blood. Blood should not escape in a cataract operation beyond the merest trace, which can be neglected. The operation I perform with an iridectomy differs in no way from the above, except in the iridectomy. The corneal wound I make is very little larger than is necessary for the safe extraction of a cataract by the ordinary method.

I have before called attention to the capsule giving way

when the lens is partly out. Of the 2616 cases submitted by me to extraction in the capsule in the current year, the capsule gave way in about 8 per cent. In half of these I was able to catch the capsule hanging out of the wound with its contained lens matter, thus leaving the capsule behind in 4.28 per cent. of the cases. This is the most serious complication in this form of operation. The operator at this juncture should keep up sufficient pressure with the strabismus hook in his right hand to prevent the capsule retracting, and, lifting an ordinary dissecting forceps with his left, he should catch the capsule and bring it with its contained matter with him. If the capsule have retracted, we should try, by gentle stroking, to press out its contained lens matter—this the experienced operator will generally succeed in doing,—and if the capsule be evident to the eye we may make an attempt to catch it with an iris forceps and fetch it out. If we cannot do this latter by one or two careful attempts we should desist and watch events.

Escape of Vitreous, so much dreaded, though not a desirable thing, I have seldom seen evil consequences from. In the 2616 cases under consideration, escape of vitreous amounted to 6.8 per cent., and in only three of them did I see evil consequences attributable thereto. Cases in which the amount of escape has been small seem to do just as well as any others. The vitreous seems to repair as well as any other tissue, and why should it not? The place of escaped vitreous is either taken by aqueous humor or it is renewed, and the tension of the eye does not seem to suffer, unless the escape be considerable.

The cases noted in the table in this paper are, with nine exceptions, only a bead of vitreous escape. The nine exceptions were in supremely nervous patients, who shot out the lens and a quantity of vitreous the moment the incision was completed. Six of them turned out well, and three were completely lost. It may be noted that the accident in these cases would have occurred in any operation. The statistics also include the extraction of some seventy-five cases of lenses couched by the *rawal* (the native ophthalmic quack operator of India), and in these we are a little more

likely to have escape than in ordinary plain-sailing cases. When the lens is half-way out, or much earlier in the case of couched lenses, a clear point of vitreous will occasionally appear in the wound behind the lens. It is due to the fact that the capsule is unusually strongly anchored in part, and refuses to give way. The moment this clear point appears behind the lens, when it is being expressed, the spoon in the left hand which has been making counter-pressure should be lifted, the strabismus hook in the right hand keeping the lens in position. The spoon should be pushed beneath the lens through the clear point and the lens suspended on it. Once the lens is supported on the spoon the strabismus hook can be used as before to drive out the lens, the spoon merely coming with the lens but not drawing it out. It will be observed that I use the spoon for the purposes of supporting the lens and preventing it from putting pressure on the vitreous. If we attempt to lift out the lens on the spoon merely, the capsule will give way with exceeding frequency. The manœuvre I recommend is in practice an easy proceeding, and prevents undue escape of vitreous.

Iritis.—2494 of the 2616 cases under consideration were extracted in their entirety in the capsule. In the remaining 112 the capsule had to be left behind. In the 2494 cases I had two cases of iritis. In the 151 cases in which I scratched the capsule and deliberately left it behind, and in the 112 in which I was obliged to leave it behind, iritis occurred proportionately distributed to the extent of about 5 per cent. In these 2494 cases I had nine absolute failures, all from suppuration. Macnamara says: "The greater my experience in these matters, the more convinced I am that most of our failures in extraction are due to the fact of soft lenticular matter and capsule left in the eye after removal of the lens." I quite agree with him. Such is the cause practically of all the inflammatory troubles, except undue meddling, and in no section of practical surgery is undue meddling followed by more disastrous results. There is a virtue in knowing when to quit and in letting "well enough" alone. The cases extracted by me this year were all done with an iridectomy, hence the absence of prolapse of iris.

In previous years I did this operation systematically without an iridectomy, unless in exceptional cases. It will be observed that iritis does not follow when the lens is extracted in its capsule, and here I do not draw a distinction between irritation of the iris and iritis; I call them both iritis. My former experience of extracting the lens in its capsule without an iridectomy led me to the same conclusion. It is generally held that iritis following cataract extraction is largely due to bruising of the iris by the lens when it is escaping, and this is also advanced as the reason why iritis follows more frequently in cases in which an iridectomy has not been done than in cases in which an iridectomy has been done, the bruising of the iris being necessarily greater. This is, in my opinion, entirely beside the mark. If extraction of the whole lenticular body in its capsule is not followed by iritis, then it follows that bruising of the iris has no connection with this iritis. The iritis following cataract extraction is, in my opinion, due to the fact that lens matter and capsule have been left behind. Why it follows oftener when no iridectomy is done than when it is done, is due to the fact that it is more difficult to get the last traces of lens matter out of an eye in which an iridectomy has not been done than out of one in which it has been done, and as a consequence it is more often left behind.

Visual Results.—I find that for reading and for fine work, a No. 12 D to No. 13 D lens is the usual one required when the capsule is removed, and that a much higher power is required when it is left behind—a fact, the importance of which is evident. When the capsule is removed, the patient can see well to do fine work, which is not the case when the capsule is left behind. When the capsule is left behind, there is invariably an after-cataract, varying only in degree of density, and the patient must have it operated on before he can see fine objects properly. Mr. F. Richardson Cross, in the paper above referred to, says, "after extraction of a lenticular cataract there will always remain some fragments of altered lens or capsule as a record of the operation," and this statement was tacitly admitted by the meeting.

We occasionally hear extraction in the capsule, as we do it in India, termed Pagenstecher's operation. Pagenstecher is the only operator outside India who extracts cataract in the capsule, but his procedure is quite different from that which we adopt in India, and there is no one more ready to admit the fact, and, think I may say, the relative weakness of the procedure he adopts, than Pagenstecher himself. In Pagenstecher's operation, the lens is lifted out on a spoon, which is incomparably a more difficult procedure than that which we adopt. It is more liable to escape of vitreous and to rupture of the lens capsule with all its consequences. Thus the Indian operation and Pagenstecher's operation are about as different as any two procedures in surgery whose objects are the same result.

From the inquiries I have received concerning this operation, not only from India but from Europe and America, it is plain that from no written description can a man learn to do this operation with satisfactory ease. It would apparently be as easy, or almost as easy, to learn the art of shoeing a horse from a written description as to learn how to extract a cataract in the capsule with ease from reading an article on the subject. It requires to be seen. Once seen, the difficulties vanish. Here I may say that, in my opinion, a man will learn more about the surgical diseases of the eye, including cataract, by looking on at some of our experienced Indian operators, in their busy season,[1] for one month, than he will do in several years by attending post-graduate clinics and lectures on the subject in Europe. We often hear it said that diseases of the fundus and errors of refraction are not common in India. I can speak for Jullundur. Here we have, both in quantity and in variety, as much as any hospital in the world. The refraction cases are in many instances due to the system of cramming school children at tender ages in this country.

By extraction in the capsule, we practically eliminate iritis and after-cataract, both of which are serious complications. An eye in which there has been iritis after cataract extrac-

[1] The busy season commences about the 20th September and ends about 10th April.

tion never recovers to be as good as if it had not occurred, and often the result is exceedingly poor. To deal with an after-cataract is as serious as to extract a cataract in its capsule, if not more so. It is a difficult operation if orthodoxly done, and the result is often far from satisfactory. The eye in which capsule has been left, whether iritis has occurred or not, and whether the capsule has been needled or not, is liable to inflammatory reaction of a serious nature on slight provocation. Once the contents of the capsule have been removed, the capsule has no longer any function in nature to perform. It is simply a part of the lens left behind. It is injured, and it behaves on slight causes as a foreign body. When the lens has been extracted in its capsule, the eye is no more subject to this liability to internal inflammation, iritis, and irido-cyclitis than is a normal eye. On this point I find that Pagenstecher holds the same opinion. By extraction in the capsule, vision is necessarily more acute than when the capsule is left behind. Capsule left behind is invariably an after-cataract, varying only in degree of density. It is always visible as such when looked at with an ophthalmoscope. By extraction in the capsule no instrument or douche need be inserted to remove lens matter from the interior of the eye—the cause of the striped keratitis we hear of, and other complications. There is no friction applied to the cornea to remove lens matter, and thus the minimum of injury is done to the epithelium of the cornea and conjunctiva. Hence we see so little of that conjunctival irritation which we see in the ordinary operation, and which we always hear attributed to using 1 in 2000 perchloride of mercury, and other strong antiseptics, to wash out the conjunctiva. It is not due to 1 in 2000 perchloride of mercury solution. It is due to too much manipulation of the conjunctiva and of the corneal epithelium. As to the drawbacks to extraction in the capsule, I know of none that is not capable of being overcome by experience. I may add that extraction in the capsule is not an operation for the inexperienced In the hands of skilful operators, extraction in the capsule is at least as much in advance of the ordinary operation as litholapaxy is in advance of lithotomy in the case of stone in the bladder.

TWO CASES OF SUBPERIOSTEAL HEMORRHAGE OF THE ORBIT FROM SCURVY.

By Dr. C. B. MEDING, New York.

Mary T. C., white, aged seven months, was brought to the Harlem Eye Infirmary, October 20, 1904, for "swelling over the left eye."

Examination showed tumefaction over the left lachrymal gland extending toward nose. There was some exophthalmus, globe pressed downward and outward and nearly motionless. Petechiæ were present on both temples, but there was no discoloration of lids. Fundus normal. The infant was very weak, emaciated, sallow; cried when handled; temperature 100° F.; anorexia and constipation. History, specific. Food had consisted of peptogenic milk powder and spirits. There was a history of similar swelling, same site, some four weeks previous, which had gradually disappeared. Infant's mother is a robust woman.

The case was watched for a week and there being no appreciable change it was referred to Dr. A. Knapp, at the Vanderbilt Clinic. No positive diagnosis was made, but some ethmoidal condition was thought responsible. A week later the case was sent to Dr. A. Caille, at the Post-Graduate, who diagnosed it as subperiosteal hemorrhage due to scurvy, and advised proper diet. Within three weeks the swelling disappeared, and the child became healthy and robust.

O. S., colored, aged eleven months, was brought to Infirmary in March, 1905, for "swellings over both eyes." Examination showed great tumefaction over lachrymal glands, upper lids were discolored, there was exophthalmus down and out, left lower limb was swollen, numerous spots of petechia on abdomen, and a temperature of 100° F. Child was weak, appeared to be very ill, and

was being fed on peptogenic powder and canned milk. History, aside from the usual unhygienic surroundings, negative.

In the light of the previous case the food was changed, the child was kept outdoors, and in a few weeks the swellings had disappeared; there was gain in weight, and the little patient became active and attentive.

In neither of these cases were there any gum symptoms, and in the first a blood examination showed no sufficient deterioration. The cases are interesting: First, because they show the need of care lest the specialist become procrustean. Second, they impress upon us the fact that subperiosteal hemorrhage, which is a late symptom in scurvy of the adult, is one of the earliest in the child, and that the gum symptoms and blood changes may be absent.

MELANOMA OF THE IRIS.

By Dr. ELIAS ANARGYROS, Athens.

Translated from the German Edition, Vol. XLVI., 1, p. 62, by Dr. Percy Fridenberg, New York.

(*With five figures on appended Plate I.*)

THE melanomata (which are to be distinguished from melano-sarcomata) of the iris are, as is well known, benign growths, so that the opportunity for microscopic examination rarely presents itself. For this reason it seems to me fitting to report the following case.

These growths have been observed clinically by von Gräfe, Fuchs, Hirschberg, Wicherkiewicz, Ancke, and others. They are often seen in the iris of the horse and of ruminants, and are known as "grape seeds." The history of my case is the following:

In June, 1901, Anton F., aged sixty-two, was admitted to the clinic of Professor Fuchs for cataract of the left eye. The patient had noticed diminution of vision during the last year. He was not aware of having a growth. There was no history of a tumor in his family. Examination of the left eye showed senile cataract, and at the lower pupillary margin a brownish black growth *1mm* wide and *2.5mm* long, running from without and behind, inward and forward (Fig. A). After dilatation of the pupil this growth protruded still more over the pupillary margin (Fig. B). The pigment margin is somewhat broadened at the upper-outer edge, where two small dark-brown growths ("grape seeds") are seen.

The tumor at the lower pupillary margin as well as the opaque lens trembles slightly when the eye is moved, as if the lens in its

outer portion had been pushed out of place by the growth. In the iris a few scattered pigment spots are seen; the pupil is round and reacts well to atropine; the anterior chamber is uniformly deep, and the eye is otherwise normal. Tn; V O S: movements of the hand directly before the eye, perception of light at 5*m*, good projection. The right eye is externally normal, with incipient] cataract. On the removal of the cataract the tumor was excised by iridectomy downwards, but crumbled almost completely. As the globe had to be enucleated after several days on account of panophthalmitis, I was also enabled to examine the small tumors on the upper pupillary margin.

In regard to the development of the melanoma, I shall first describe the sections of the large growth, at the lower pupillary margin. The soft, prominent melanotic mass on the posterior surface of the iris had, as has been said, crumbled during the operation, carrying with it the posterior layer of retinal pigment (a), so that the posterior boundary of the iris was formed mainly by Bruch's membrane (b) and by remnants of the anterior layer (c) of the retinal pigment. In front of these there are accumulations of very dark pigmented cells in the deeper layers of the iris stroma (d, e). The individual cells are irregular in shape, and so completely filled with fine, round, clear, dark-brown pigment granules that the nucleus cannot be distinguished. These cells form large black masses around which other cells are more loosely grouped. A few cells are found at a distance in the stroma, like those which are found at the periphery of the sphincter of highly pigmented irides. The latter are probably to be considered as derivants of the retinal layer which have been scattered in the stroma of the iris (Fuchs). The cells of the melanoma, accordingly, originated in the retinal pigment cells of the posterior surface of the iris. This seems also to be shown by the fact that at certain points the cells of the melanoma extend through Bruch's membrane to the posterior surface of the iris, and rise above it (f). Finally, a direct extension of Bruch's membrane into the pigment cells can be seen at the edge of the tumor (Fig. 1, g. Fig. 2). According to Grynfeltt and Hernfordt, Bruch's membrane is simply the modified extremity of the anterior retinal cell layer, so that the melanoma is developed from the anterior layer of the retinal layer, and from the pigment cells of the iris stroma originating in that layer. It is impossible to say to what extent the posterior cell layer has par-

ticipated in the formation of the melanoma, as this posterior layer as well as the protruding portion of the melanoma is missing; but, as we shall immediately see, another similar melanoma nodule is undoubtedly developed from the posterior retinal cell layer, so that it is quite probable that this layer has been concerned in the growth of the large melanoma—probably the very part of the tumor which protruded into the posterior chamber developed in this way. The sections which were made of the two small melanotic nodules at the upper and outer margin do not show the growth—but, as it were, only their roots; that is to say, an accumulation of pigment cells in the stroma of the iris itself which have exactly the same appearance as Fig. 1. The third series of sections through the temporal half of the iris, somewhat below the marginal growths, show a small melanoma which could not be seen during life, as it lay behind the iris, somewhat nearer the ciliary margin (Fig. 3, a). This growth was round, not quite $\frac{1}{2}mm$ in diameter, and originated in the deepest layer of the retinal pigment epithelium, with which it is continuous. This mode of development is shown quite clearly by the fact that in consequence of inflammation the anterior pigment layer (v) is separated from the posterior layer (v v) by fluid. The tumor is composed of irregular pigmented cells, which lie close together and are somewhat smaller than the previously mentioned pigment cells. The tumor is partially inclosed in a connective-tissue capsule, which probably developed as a result of the inflammation and lies directly upon the lens capsule (e). This case shows that the melanomata arising from the pigment epithelium of the retina may develop from the anterior as well as from the posterior cell layer, and perhaps most frequently from both simultaneously. The site of election for the development of such melanomata is: First, the pupillary margin, where both pigment layers so frequently present a thickening; and second, the region of the peripheral margin of the sphincter. Here, even under normal conditions, we often find an invagination of the retinal layer into the stroma of the iris, forming a spur-like projection of Bruch's membrane toward the peripheral sphincter margin. This membrane is reckoned to the retinal portion of the iris, and here the retinal pigment cells mentioned above are often found scattered in the stroma. Both the large melanoma and the two small growths at the upper margin have originated in these cells. The

fourth tumor situated near the ciliary margin of the iris is thus far unique. It is evident that such melanomata cannot be discovered *intra vitam*, unless they should become so large as to cause a noticeable protrusion of the iris; and even then could hardly be diagnosed with certainty, as they themselves would not become directly visible. Melanomata of such a size so near the periphery have not yet been reported. Fuchs and Knapp have made microscopic examinations of melanoma of the iris. In Fuchs's case the distribution of melanoma cells in the substance of the iris was like that described by me, and Fuchs now interprets this case as a development of melanoma from retinal cells. At that time, twenty years ago, the retinal origin of the posterior layer of the iris was not known, and in Fuchs's publication the development of the melanoma is ascribed to the stroma of the iris.

Collins, Alt, Bayer, and others have examined the "grape-seed" growths of the horse's iris, which also consist of cells of the retinal layers of the iris. Into these small tumors a connective-tissue framework grows from the stroma of the iris, carrying blood-vessels with it. Knapp says: "They consist, as I have determined from the examination of a specimen of Professor J. Arnold's, of a circumscribed but massive development of anastomosing branched cells from the stroma of the iris, most of which are pigmented. There is no sharp border separating them from the neighboring tissue, and the rest of the iris is perfectly normal." From this short microscopic description it is impossible to say with certainty whether this case was one of melanoma, or of a commencing sarcoma of the iris, particularly as there is no clinical report of the case.

From the histological findings presented above we must accept the view that melanomata as well as "grape seeds" arise from the retinal pigment layers of the iris.

NOTES ON THE EXAMINATION FOR CENTRAL SCOTOMA.

By Prof. C. HESS, Würzburg.

Translated from the German Edition, March, 1905, by Dr. Matthias Lanckton Foster.

DURING my studies of the foveal vision of the totally color-blind, I discovered that the usual methods of detection of absolute central scotoma did not give sufficiently accurate results, on account of the nystagmus which is present in the majority of the totally color-blind. I therefore devised the following new method: Little white disks, arranged in regular rows on a black ground, were made visible by means of momentary illumination. One or more of the disks could be rendered invisible by covering them with black paper. The patient is placed at such a distance that a smaller or greater number of the disks will be pictured on the region of the retina undergoing examination, and has to state whether at the moving of the shutter all the disks were visible or not, how many were absent, and what were their respective positions. If this experiment is repeated several times and the patient always gives correct answers, a scotoma is certainly excluded from the area under consideration.

At the meeting of the Heidelberg Society in 1903, Uhthoff remarked that a demonstration of a slight scotoma with the perimeter would be more conclusive than a failure on the part of the patient to perceive a disappearance of certain points in a system of points during momentary illumination, because during such momentary illumination the patient is

inclined to complete the picture, just as he is in investigation of the blind spot in a normal eye. I immediately showed the untenability of this objection by the fact that the patients in question stated correctly whether all the disks were visible, and whether one or more were covered. If Uhthoff's idea as to the completion of the picture in the blind region were correct, the patient could not recognize with the part of the retina under consideration whether the disks were covered or not. But the best proof of the error of Uhthoff's theory was obtained by investigation of Mariotte's spot, to which he had referred. If, in an examination according to my method, the white disk whose image would fall on the blind spot of a normal eye is covered, the patient cannot see that it is covered, and makes a false statement if, according to Uhthoff, he tends to complete the picture. But if the patient answers correctly whether the disks which should be seen with that portion of the retina are covered or not, he furnishes irrefutable evidence that this region cannot be blind.

Although at that time I immediately demonstrated the incorrectness of Uhthoff's theory, Heine has again brought it forward without mention of the refutation. He writes[1]: "If a uniform pattern of points is used, as suggested by Hess, it is probable to start with, as Uhthoff remarked in the discussion of Hess's paper, that in the region corresponding to this scotoma the picture would be filled out or completed as in the region of the blind spot, especially during momentary illumination." Heine adds, that only exceptionally, when the scotoma was very large and partly absolute, did the patients investigated by him, who had positively demonstrable congenital scotoma, state that some points were perhaps wanting in the middle of the pattern, but that with either momentary or prolonged illumination they usually detected no defect with "Hess's pattern," "although they correctly recognized the defect when a point was covered, mostly by momentary illumination." Heine has not noticed that his statements here cannot be

[1] *Klin. Monatsbl. f. Augenheilk.*, Jan., 1905, p. 20.

reconciled. If the patient fills in or completes the pattern in the blind region "in the same way" as in the region of the blind spot, it is impossible for him to correctly state whether the disks in question are covered or not, and if he does state this correctly both the assumed "filling in" and the functional incapacity of the region in question are excluded.

Every normal eye has a congenital absolute scotoma corresponding to the entrance of the optic nerve, and also, at a point corresponding to its foveal region, a blind spot in adaptation to the dark with a sufficiently lowered illumination, and a relative scotoma when the illumination is less lowered (lessened foveal sensitiveness of the eye adapted to the dark).

It can be easily shown by a simple experiment that Uhthoff and Heine base their theory of the completion of the picture on an incorrect hypothesis. If sixteen or twenty-five little white disks are arranged in four or five rows of four or five each on a black background, at a satisfactory distance apart, and placed at such a distance from the eye that the image of one will fall on the entrance of the optic nerve, that disk will appear to be absent from the row, and the pattern will appear to be defective and will not be "completed."

If the lessened foveal sensitiveness of an eye adapted to the dark is studied in a similar way with illumination of either long or short duration and with the illumination suitably reduced, the white disks pictured on the fovea will appear less bright than those placed excentrically. If the illumination is reduced still more, the disks pictured on the fovea become invisible, and the observer will be unable to state whether they are covered or not. There will be found no trace of completion of the picture. Thus the scotomata dependent on congenital conditions, especially Mariotte's spot, are demonstrable by my method with certainty and without difficulty. They behave altogether different from the congenital scotomata mentioned by Heine. Whether there are congenital scotomata which behave entirely different from the physiological ones of the normal

eye we do not know, but it has been shown that an absolute scotoma with such peculiarities as those described by Heine is an impossibility.

This disposes also of the further statements of Heine that "the demonstration of central congenital scotomata by means of Hess's pattern of points is usually unsuccessful," and that a differential diagnosis can be made "whether a patient makes positive or negative answers with Hess's pattern. In the first case the scotoma is not congenital, in the second it probably is."

The following utterance of Heine may give rise to confusion. He writes, speaking of congenital defects: "If the blind or amblyopic region lies in the middle of the eye, the eye naturally concentrates its attention not on this region but on the better functionating places on its temporal and nasal sides, and functionally we have to do with a paracentral scotoma." Here Heine departs from the usual method of designation, and calls any place central upon which the eye concentrates its attention. According to that, a congenital central scotoma would be functionally impossible. In this regard Heine contradicts his own statements, for a certain part of his work is devoted to the functional evidence of central scotoma, and he says in other places that the latter correspond more or less accurately with the fovea or macula.

I am very sorry to have been obliged to make these explanations. They were indispensable in view of the questionable results to which Heine has been led in the discussion of my method through his repetition of long since refuted errors.

TENOTOMY AND ADVANCEMENT.

By Prof. CONRAD FROELICH.

Abridged Translation from the German Edition, XLV, iv, August, 1902, by Dr. Matthias Lanckton Foster.

WHEN it is remembered that strabismus may not only diminish but completely disappear spontaneously, that the orbits of childhood become remodelled by the growth of the bones, and that the posterior section of the eyeball, the muscles and their insertions, become changed in form and tension, it is clear that a primarily good result from a tenotomy may become an artificial divergence. If this is true, the final result of a tenotomy in a child cannot be calculated because of the entrance of factors which are beyond our foresight and control. Permanent unobjectionable results, eyes in good position when looking at near and distant objects, undisturbed harmony of the lateral movements and of convergence, palpebral fissures of an equal height and a natural facial expression, do not follow tenotomies very often. Most of the results are cosmetically only moderately good, while in very few cases is monocular vision transformed into binocular, and the primary results are greatly modified in the course of time by subsequent purely mechanical conditions and by the act of vision, so that they may be even reversed. The fear of these later changes also impels one to do too little and to be content with an imperfect result, trusting to the angle α to cover the deficit.

An operation for strabismus should be performed to obtain not only the best cosmetic result possible, but also to preserve with the least possible insufficiency the functional

activity of all the muscles of the eye. The strength of the antagonist to the affected muscle plays an important part, and when tests prove the antagonists to be sufficiently qualified a tenotomy may be performed on one or both eyes. An ideal result depends on strong antagonists and a sufficient power of vision of the squinting eye to secure a certain degree of binocular vision to act as the chief regulator of the position of the eye. A union of these two factors is more frequently obtained after an advancement than after a tenotomy.

If the end of an ocular muscle is transplanted over its natural insertion toward the cornea the inner surface of the advanced muscle grows fast to the outer surface of the sclera. This was shown in the following case. A young man needed a readvancement of his right external rectus which had been advanced some years before. The conjunctiva was undermined outward from the scar at the margin of the cornea so as to lay bare the dark red muscle which had to be separated from the sclera with scissors. The attachment was firm and extended exactly to the physiological insertion, beyond which the relations between the muscle and the sclera were normal.

Landolt has correctly pointed out that the term advancement should be applied only to operations in which the end of the muscle is moved over toward the cornea. When a piece of the muscle is removed and the cut surfaces united, resection is a better term to use.

The usual explanation of the effect of an advancement is that because the advanced muscle girdles the globe to an extent increased by the distance between its original insertion and the margin of the cornea, its efficiency is increased so as to enable it to produce greater motility of the eyeball. But this is not the true explanation, as I demonstrated in the following way. During the advancement of an externus of a leucomatous eye, I measured the distance of the insertion from the corneal margin with a pair of compasses. Frequent measurements of the excursions of the eye were made during the next six weeks, and at the end of that time I made

a curved incision 1*cm* long, parallel to the line of insertion, down to the sclera, at the distance from the cornea previously determined. This incision completely isolated the transplanted end of the muscle from the rest, and yet the efficiency of the muscle was not in the least impaired. This showed that after the operation the anatomical insertion still formed the point of termination and insertion of the muscle, which had been shortened by the portion advanced and thereby rendered more able.

An advancement draws the eyeball deeper into the muscular funnel, but chiefly to one side. The muscle gains in elasticity, as shown by Czermak and Judeich, and also in efficiency, as may frequently be demonstrated by observing that, whereas before the operation the cornea can approach the outer canthus only with difficulty, it can afterward do so with ease. Such an increase in strength is due not only to the shortening and the increased elasticity of the muscle, but to the fact that it acts upon the correct and physiological point of insertion, a new insertion in the old place. In this respect advancement approaches the ideal operation more nearly than resection. The advanced muscle also gains an enlarged sphere of action because its outlying attachments are brought forward with it, and consequently do not act as restraints. There is at the same time a diminution of the excursive ability of the antagonist to the advanced muscle because of the increased resistance it has to overcome. Landolt has seen marked enlargement of the field on the side of the advanced muscle with no diminution on the opposite side, and gives as an explanation that the opposite muscle remains unchanged. But I have so often seen greater or less losses of motility on the part of the antagonist to the advanced muscle that I can ascribe a different observation only to a different mode of operation. By an advancement not only is the weaker muscle strengthened, but the overstrung muscle is weakened as if a bloodless tenotomy had been performed.

I perform the operation of advancement almost invariably without chloroform in adults and sometimes in children.

The reaction after the operation is greater than after a tenotomy, but is not serious, and disappears so quickly that a careful stereoscopic examination is possible on the third or fourth day. I have not seen a case of infection in fully five hundred operations.

The instruments I use are a fine strabismus forceps, fixation forceps, straight and curved scissors, a strabismus hook, a needle-holder, three curved needles, one larger than the other two, and a medium-sized silk suture. A small needle is placed on each end of a silk thread 40 to 50*cm* long. The middle of the thread is folded together and passed through the eye of the larger needle, which is then seized with the needle-holder.

After the eye has been rendered anæsthetic, a horizontal incision is made in the conjunctiva from the margin of the cornea to the insertion of the muscle, and the margins of the wound retracted upward and downward. The tendon is then grasped with the fixation forceps, and is separated together with the capsule from the sclera. The upper and lower ends of the insertion which are still adherent are then divided with scissors introduced through the opening thus made. The points of the scissors are then passed about beneath the muscle to detect and cut away any remaining attachment.

The second step in the operation is the introduction of Weber's loop. The fixation forceps are drawn downward and backward from the globe, so as to expose the whole breadth of the inner surface of the belly of the muscle. The larger needle carrying the loop of thread is then passed through the muscle, exactly in its middle, 6 to 10*mm* from the tendon, and brought out through the conjunctiva so that the loop comes to lie on its outer surface. The fixation forceps are then removed. Each of the two small needles at the ends of the thread is now introduced subconjunctivally as close as possible to the margin of the cornea, not quite to the vertical meridian of the latter. This manœuvre is performed more easily by making a subconjunctival track with a hook and then passing the needle beneath the hook. It is desirable to introduce the needles as

close as possible to the cornea, because at its margin the conjunctiva is immovable and furnishes a firm anchorage. In exceptional cases, particularly in old people, the conjunctiva is too friable to furnish a firm hold, and then the needles must be introduced into the superficial layers of the sclera. The points where the needles are introduced should be placed symmetrically so as to form an isosceles triangle, the apex of which is situated in the middle of the belly of the muscle, while its base is formed by a line joining the two points at the margin of the cornea.

The third step is the stretching of the muscle. After the needles have been removed, the loop of thread is caught about one of the fingers of the left hand of the operator, the two free ends are taken in his right hand, and then both the loop and the ends are drawn toward the cornea slowly but with steadily increasing force. If this step is neglected a sufficient effect will not be obtained. There is no danger that the muscle will rupture or the threads cut through.

The fourth step is to secure the muscle at the margin of the cornea. The two free ends are passed through the loop in opposite directions; each is seized in one hand and pulled until the loop has disappeared and resistance is felt, when the muscle has been advanced to the maximum in the horizontal meridian, and the ends are tied.

This method of advancement is free from the danger of producing a change in the axis of the muscle, which is present when two threads are used, and also from that of the threads tearing out of the muscle, which may happen when they are passed through the upper and lower thirds.

It is said that a certain part of the immediate effect of an advancement is lost, so an over-effect should always be produced. This is not true. Over-correction is unnecessary. It is true that any tissue tension yields and that the result of an advancement is a certain tension of the muscle and capsule, but the effect of such yielding is reduced to a minimum by the rapid union of the tendinous fibres of insertion with the corresponding portion of the inner surface of the muscle.

The ends of the tied thread should not be cut off, but

should be formed into a loop passed around the ear and then gradually tightened and tied so as to produce a more or less divergent strabismus without contraction of the externus. This muscle is then at rest and can unite the more quickly with the proliferating fibres at the insertion. It is better if the internus is stretched at the same time so that the eyeball cannot rotate in its direction. There is no danger of later divergence.

If the primary effect is too slight, a double bandage, darkness, and rest in bed for three or four days can be used in conjunction with the ear loop and atropine to increase it. After the removal of the bandage, fully correcting glasses should be worn and stereoscopic exercises instituted. Perseverance is needed to overcome the difficulties which arise and treatment may often be needed for several weeks after operation, but diligence will not rarely be rewarded by the appearance and growth of binocular single vision, which is an important factor in the maintenance of the position of the eyes. Perfect binocular single vision is obtained in only a small proportion of cases; most remain imperfect. I agree with Landolt that the post-operative encouragement to binocular vision is most important. The operation is the coarse, the after-treatment the fine, work in the regulation of the balance of the eyes and the play of the muscles.

The effect can be regulated to a certain degree during the operation, but the dogma that this can be done by measuring the distance between the tendon and the point of puncture in the muscle is not true. The ability of the muscle to stretch is much too variable. The effect produced depends exclusively on the length of the piece of muscle drawn over the anatomical insertion, and this is again dependent, at least in part, on the yielding temper of the muscle itself. It is immaterial whether the suture is passed 6 or 9*mm* behind the tendon. Different results can be obtained with the same point of puncture. The only important point is to go so far back of the tendon that the thread will not cut out under strong tension and will bring the muscle to the corneal margin. I have repeatedly seen very little effect obtained when the suture had been introduced back almost

to the fornix. Only the anterior section of the muscle can be stretched, and the most suitable place for the passage of the suture is between 6 and 10*mm* back of the tendon.

In squints of high degree and long duration, Landolt shortens the advanced muscles by resection of their ends and in the worst cases adds tenotomy. By my method I avoid resection; the effects are good enough without it, but I modify the above-described technique when I desire a minimum or a maximum effect. For a minimum effect, I divide the tendon in the middle only, leaving the ends adherent, pass the needle carrying the loop through the boutonnière so formed, and perform the balance of the operation as before. For the maximum effect, after completely severing the tendon I pass the scissors between the muscle and sclera backward, upward, and downward, to mobilize the muscle and connective tissue so they will yield more and be drawn forward more easily.

Over-effects rarely occur. I have obtained them exceptionally in squints of less than 3*mm* from too energetic an operation, but they are of no importance, because by slackening the tense, but not yet tied, threads while the patient is still on the operating table the eye can be caused to assume the desired position. Still if the operation is performed under narcosis, or if the patient is so unruly as to render it difficult to regulate the effect, some divergence may be left. In such cases it is better to secure the thread with a loop rather than to tie it, and to postpone the adjustment until later, perhaps until the next day. Nothing is thus lost. The length of time during which post-operative adjustment is possible is a great advantage which this operation possesses over those in which if an error is made in calculation rectification can be made only by another operation.

This operation is a musculo-capsular advancement and is more efficient than an advancement of either muscle or capsule alone. For a convergent concomitant strabismus of about 2*mm*, advancement of the partially severed muscle suffices. The internus is weakened slightly or not at all, and forms a protection for an amblyopic eye against secondary

deviation. For such slight cases tenotomy is much less useful, and Czermak is right when he says that it should never be performed. Most cases of strabismus have from 3 to 6 or *7mm* of convergence, and demand the advancement of the fully severed muscle, which produces an effect of from 3 to 5*mm*. The effect fluctuates even in skilful hands because of the varying extensibility and elasticity of different muscles. It is greater in children than in adults because of the greater mobility of the capsule and the better quality of the advanced muscle, as well as the absence of insufficiency due to secondary structural changes which are met with in adults.

An important question is not only how but what to advance. Many authors plead for a double operation even in very slight degrees of strabismus, but I have very often performed a single advancement in convergence of 3 to 3½*mm* with success. For greater degrees of strabismus the double operation is necessary. If in any case the result is insufficient, a single or double tenotomy may be performed at a later period. Sometimes all the muscles are weak. I have seen the need of a double tenotomy after a double advancement to correct a 4*mm* convergence in a patient fourteen years old.

After an advancement there are to be seen varying degrees of ptosis, increased efficiency of the advanced muscles, decreased efficiency of their antagonists, and a swelling. The ptosis is transient and unimportant. The disfiguring lump is formed by the folding together of muscle and capsule, varies greatly in size and disappears more or less completely in a few weeks. It affords no hindrance to the activity of the patient, as it may be rendered pale and flat by the use of adrenalin and is the cause of no danger. The increased efficiency of the advanced muscle is almost always permanent, while the decrease in that of its opponent diminishes. In order to make this decrease more permanent I have recently combined stretching of the strabismic muscle with advancement of its antagonist. The following case is an illustration.

E. R., seventeen years old. Convergent concomitant strabismus for fourteen years. Left eye turns in *9mm.* L V, $\frac{1}{10}$; R V, 1. Hypermetropia of each eye, 3 D. When the eyes were turned to the right the greater part of the left cornea disappeared in the inner canthus and the globe was retracted so that the palpebral fissure became *2mm* narrower. Adduction to the right was less energetic. Both externi were insufficient, so that *2mm* intervened between the outer canthus and the corneal margin.

After the speculum had been introduced, a small incision was made in the conjunctiva over the tendon of the left internus, through which a strabismus hook was passed and the muscle seized. Tension was then made slowly, but with increasing force until the nasal margin of the cornea reached the outer canthus, where it was held for several minutes. After removal of the hook and speculum, the outer margin of the cornea easily reached the canthus, when the abduction of the eye was tested. The left externus was then advanced. Immediate effect, *6mm.* Advancement of the right externus corrected the remaining *3mm.* The position of the eye was then maintained beneath the covering hand, and there was persistent binocular fixation at 10 to *12cm.* The final result was perfected by means of double ear loops, bandage, stereoscope, and correction of the hypermetropia under atropine.

Lack of experience forbids me to recommend this combination, but I ought not to let it go unmentioned on account of the great ease and safety of the procedure. The muscle might first be stretched and afterward tenotomized, if the effect of the operation should prove insufficient. It might give the needed help in deviations which are too great for one, but too small for two advancements ($3\frac{1}{2}$ to *4mm*). In cases in which it is necessary to confine the operation to the squinting eye, it may take the place of a tenotomy, and possibly it might be employed as a preliminary to the full correction of the hypermetropia. The credit of the origin of the idea of stretching the muscle is due to Panas, but he added a double tenotomy, forming an operation which Judeich strongly condemns.

Advancement and tenotomy performed on the squinting eye have been preferred to any operation which needs to be

failure of vision of the occluded eyes. For the purpose of confirmation my assistant, Dr. Heimann, treated in the same manner the following case, which I had frequent opportunities to observe.

A child, five years old, had marked strabismus of an amblyopic left eye. Light was excluded from the left eye by means of a celluloid shell secured in position by means of plaster which allowed the eye to wink normally. This was worn seven weeks. At the end of that time no loss of vision in the occluded eye could be demonstrated, but the vision of the squinting eye had improved from $\frac{1}{12}$ to $\frac{1}{3}$.

Whether one operates in cases of strabismus for purely cosmetic purposes, or to obtain a more or less perfect binocular vision, one will always prefer the method by means of which the best results are to be obtained without risk of later bad effects, and best preserves the harmony of the lateral movements, of accommodation, convergence, and the natural appearance. The correction of a slight deviation by a unilateral, and that of one of a moderate degree by a bilateral advancement, leave nothing to be desired. I have rarely seen unobjectionable results from tenotomies, either in my own practice or in that of others, because good vision and abduction are seldom obtained together. When one of these factors is wanting, the final result will be too little or too great, and even when the objective position is correct, the adduction is frequently limited and the eye has a rather staring, unphysiological appearance. Nevertheless in the extreme degrees of strabismus tenotomies are necessary, although if an advancement is performed first only a monolateral tenotomy will usually be required. In very exceptional cases it will have to be bilateral and thorough. In this way is fulfilled the postulate to obtain great correction with the least possible insufficiency.

According to my observation, a paralytic strabismus can be corrected more satisfactorily by an advancement than by tenotomy. The following clinical histories are furnished in evidence.

CASE 1.—A woman, thirty years old, had suffered since September, 1900, from diplopia, with headache and dizziness. Medical and electric treatment had proved of no avail.

March 1, 1901.—Left eye converges 3*mm.* Vision = 1. Homonymous diplopia. At a distance of two or three metres the images are 30*cm* apart in the middle line, a separation which increases rapidly when the object is moved toward the left. Images are fused with prism 24°. Advancement of left externus. Immediate effect: crossed diplopia at one metre; fusion with 6° prism. Loop loosened. Apparently correct position under the covering hand. Further observations were not made on account of the restlessness of the nervous patient.

March 8th.—Single vision even with red glass. Testing the balance of the muscles by means of prisms showed a crossed diplopia which was corrected by a 2° or 3° prism.

March 11th.—Single vision. Position of eye correct under the covering hand, and when the equilibrium was tested with prisms.

May 22d.—Single vision everywhere without red glass. With a red glass there is crossed diplopia when the eyes are turned 45° to the right of the middle line.

Dec. 18th.—Perfect position. Single vision. No trace of diplopia.

April 28, 1902.—Condition the same.

In this case a good result was obtained from a monolateral advancement. The immediate effect was too great, and for a time there was an insufficiency of the left internus—another evidence that the antagonist of the advanced muscle is weakened.

CASE 2.—A woman sixty-eight years old. Diplopia suddenly appeared six years ago. All treatment has proved of no avail.

Feb. 13, 1902.—Vision of each eye = 1. The head is held obliquely. Strong adduction of each eye. In abduction the margin of the right cornea is brought to the outer canthus, while the margin of the left cornea fails to reach the canthus by 1½ *mm.* Convergence 3*mm.* Homonymous diplopia, with a slight difference in the height of the images, which diminishes as the object is moved toward the left. Double images fused with prisms 40°-50°. Paresis of left abducens with secondary contracture of right.

Feb. 14*th.*—Advancement of left externus. Immediate effect insufficient. Limitation of movement scarcely 1*mm* less, but convergence clearly lessened. Advancement of right externus. Position apparently correct.

Feb. 15*th.*—After removal of the ear loop there is manifest divergence of 2*mm*. Bandage removed and stereoscopic exercises ordered.

Feb. 16*th.*—Divergence gone. Correct position for far and near. Single vision everywhere.

March 13*th.*—Single vision. Testing the equilibrium of the muscles with prisms shows 5° to 7° convergence. Right eye abducts strongly, but the left cornea still fails to reach the outer canthus by 1*mm*.

May 1*st.*—Condition the same.

This was also a satisfactory result, although the effect was too great even on the day after the operation. Such a divergence in concomitant strabismus is unimportant if convergence exercises are immediately instituted, particularly if a sufficient tendency to fusion is present, as the tissues are in a yielding condition. There should be no haste about removal of the sutures as the whole effect may be annulled thereby.

Case 3.—A man twenty years old. Three years ago he had otorrhœa, and some months after it had stopped diplopia suddenly appeared. All treatment has been in vain.

March 9, 1901.—Vision of each eye 1. Left eye converges 5*mm*. Abduction of each eye deficient. Adduction 2*mm* too great. Deviation of each eye about the same. Diplopia in all parts of the field, the distance between the images increasing whenever the object is moved either to the right or to the left. Fusion with prism of 60°.

March 11*th.*—Advancement of both externi *ad maximum*.

March 12*th*—The equilibrium test of the eyes shows 8° of convergence. Stereoscopic exercises ordered.

March 14*th.*—Homonymous diplopia corrected by a 10° or 12° prism.

March 15*th.*—Position under the covering hand appears to be correct for 40*cm* and for 5*m*. Light appears single as far away as 3*m*, then double.

March 18*th.*—Very slight convergence under covering hand for

30 or 40*cm.* With red glass single vision at 2*m.* Equilibrium test shows 8° of convergence. Binocular stereoscopic vision.

March 21st.—Single vision at 5 metres throughout the field. Equilibrium test shows 10° of convergence.

March 26th.—Single vision for both distance and near.

May 10th.—Single vision. Correct position. Equilibrium test shows 2° of convergence.

July 15th.—Single vision. Equilibrium test shows orthophoria.

Sept. 19th.—In abduction the margin of each cornea passes somewhat beyond the commissure. There is 5° or 6° of esophoria. The eyes are in a correct position and there is single vision with a red glass.

April 1, 1902.—Condition the same.

In this case the final result of the double advancement for the bilateral paresis of the abducens was eminently satisfactory.

Let us contrast these histories with this one of Schweigger's.

Paresis of right abducens. Vision 1. The right eye converged 4*mm.* Just before the operation was performed, a 39° prism fused the images. Tenotomy of the right internus. A week later single vision at 1 metre; diplopia at 5 metres corrected by a 12° prism. Tenotomy of left internus. In addition to the homonymous diplopia, crossed diplopia was then produced when the object was moved to the right. Otherwise no effect. Fourteen days later the fresh adhesions of the left internus were broken up by means of a strabismus hook, but without producing any effect. Four days later the abducens was advanced with an excellent result.

A paretic muscle becomes more efficient after an advancement, and in such cases as these it is even more rational than in concomitant strabismus to strengthen the weak, rather than weaken the strong, muscle, because we know that the factor chiefly depended on to produce the desired effect after tenotomy, the power of action of the antagonist, is certainly wanting.

Even though the divergent forms of strabismus are usually

more difficult to correct by means of an advancement than convergent, this is not true of artificial divergence. A single advancement is able to correct 4 or 5*mm* of artificial divergence because the conditions present differ from those met with in the other forms. Concomitant divergent strabismus depends on a weak internus and a strong externus, but the contrary is the case in secondary deviation. The externus is as weak as it was before the operation was performed, and the internus is usually very powerful, even when the divergence has existed ten or twenty years. Any one who has made many corrections of such artificial squints will confirm Albrecht von Graefe's observations of the fresh red appearance of the belly of the muscle, and of its marked ability to act after its readvancement, but will be unable to confirm Alfred Graefe's statement that the readvanced muscle cannot work. Naturally there are variations in the efficiency of these muscles, but usually the internus has not lost as much energy as might be expected.

I have not made these remarks in the interest of a certain form of advancement, although I can recommend my method on account of the ease and quickness of its performance, the degree and graduation of the effect, and the fact that neither narcosis nor assistants are necessary, but rather to uphold the principle that muscular advancement is the operation by means of which the greatest effects may be obtained with a minimum, or even absence of, insufficiency, and can be performed on very young children, even for very slight deviations, without dread of bad after-effects.

TETANY-CATARACT.

By Dr. ED. ZIRM, Olmütz.

Translated from Vol. LII., German Edition, June, 1905, by Dr. Percy Fridenberg.

On the authority of O. Becker[1] and Schmidt-Rimpler,[2] credit is due to Saemisch for having first pointed out, if only by word of mouth, the connection of cataract formation with antecedent attacks of spasm. In O. Becker's *Pathology and Therapy of the Lenticular System*, the chapter on "Nuclear Cataract" contains the following sentence: "Quite often it appears, from the previous history, that convulsive seizures, in women probably hysterical in character, had preceded (verbal communication of Saemisch)." This was eventually corroborated by various authors. Logetschinkow in 1872 published eight cases of soft cataract after tonic spasms. Schmidt-Rimpler in 1883 laid stress on the connection mentioned. Landsberg in 1888 reported two cases of double cataract coming on two years after extirpation of a goitre, convulsive attacks having taken place a few months after operation. Rosenblatt, Fonseca, Logetschinkow, have reported similar cases, and Tepliaschin and Kortnew in 1892 published a large series of cases of total cataract in the convulsive form of ergotism.

It remained for Wettendorfer in 1897 to lay stress on the relation of tetany to cataract-formation,—Meinert and Bernhardt having each reported a case of tetany associated with zonular cataract,—and to observe correctly that without doubt many of the earlier publications had to do with tetany, the clinical picture of this affection being unfamiliar

[1] Peters, monograph: *Tetanie u. Staarbildung*, p. 9.

[2] *Klin. Monatsbl. für Augenh.*, xxi., p. 246.

to the authors. The similarity of the convulsions of ergotin intoxication and those of tetany has been pointed out repeatedly (Mosson, Hasse), yet it has not been shown beyond a doubt that the two are identical. We owe to Peters more exact information on the subject of tetany-cataract. Microscopic examination of extracted lenses led him to the conclusion that interference with the conveyance of normal nutriment to the lens produces a shrinking of the nucleus and eventually leads to the formation of gaps and fissures in the cortical layers. At first, spastic contraction of the ciliary muscle with temporary interruption of nutritional supply was believed to be the cause of these lenticular chagesn, but further investigations led Peters to a different hypothesis. In rabbits poisoned with naphthalin he found an increase of chlorides in the aqueous, and in the case of a woman of twenty-nine, who had had repeated attacks of tetany-convulsions after her confinement, and died of nephritis after cataract had developed, microscopic examination of the eyes showed the ciliary processes lined with a single layer of enlarged cells with hyaline degeneration of the protoplasm. According to Peters, the function of the protoplasm of the cells of the ciliary processes consists in the production of a nutritive fluid, for the osmotic supply of the lens, which is poorer in albumin and salts than the blood plasma. These cells must accordingly have the faculty, under normal conditions, of retaining certain substances, a faculty which they lose when diseased.

Comparative determination of the concentration of the aqueous, as expressed by electrical conductivity, showed that in rabbits with naphthalin-cataract the salt-content of the aqueous had risen from 0.03% to 0.045%. Peters accordingly considers the degeneration of the epithelium of the ciliary processes, with a resulting pathological increase in the chlorides of the aqueous, the mediate cause of cataract-formation. As similar changes of the ciliary epithelium have been noted in senile and in diabetic cataract, Peters's investigations give a logical explanation for the development of these and probably for that of other forms of cataract as well.

It would appear that the cause of diabetic cataract is not to be found in a hypothetical increase of sugar in the tissue-juices of the eye, as Hess and others have believed. Peters applies his theory to the causation of zonular cataract in children.

It is known that Arlt considered the convulsions of rhachitic children a causational factor in the development of zonular opacities—a view which was lost sight of after Horner called attention to the nutritional disturbances which rickets produces in epithelial structures. Zonular cataract was then looked upon as analogous to the defects in the enamel of the teeth.

After the investigations of Schirmer and Hess, it was generally taken for granted that the lens layer produced at the time of disease, that is to say, the most peripheral layer for the time being, became opaque, while during the succeeding period a clear layer of fibres was developed, and zonular cataract in children was looked upon as a disturbance of nutrition caused by rhachitis. Measurements of zonular cataracts, made by Dub and by Treacher-Collins, seemed to invalidate this theory, as their figures were too low to correspond with the diameter of the lens periphery at birth. It was then necessary to assume, as Hess actually did, that the development of zonular cataract begins during intra-uterine life. Peters contended that our knowledge is very vague in regard to rhachitis during the period of fœtal development, and, furthermore, that it should have been possible to demonstrate, if only in a single case, the presence of zonular cataract in the newly-born. From this point of view he contends for the development of zonular cataract after birth, and brings the condition into relation with convulsions, which he is inclined to interpret as tetanic.

To rhachitis, as such, he attributes the significance of a predisposing factor only, just as in some cases these convulsions are induced by gastro-intestinal and other disturbances. In this way the question of the etiology of zonular cataract has again come to the fore. Of ten children suffering with tetany, Peters was able, in four, to observe the development of zonular opacities.

It must be left to further investigations to determine whether spasm of the ciliary muscle, as a syndrome of other convulsive affections, has any important part in the causation of cataract, or whether the principal rôle is played by nutritional disturbances of various kinds, producing morbid changes in the ciliary epithelium, or, finally, whether the lenticular opacity is to be regarded as a direct product of toxines which enter the aqueous from the general circulation and affect the capsular epithelium and lens substance, a mode of development which Salffner has, quite lately, shown to be the probable explanation of naphthalin-cataract.

In experiments on cataract following ergotin intoxication, Peters observed changes analogous to those of naphthalin- and tetany-cataract—namely, cysts in the ciliary epithelium containing a coagulated or homogeneous mass, and changes in the pigment of the epithelium, the granules being crowded toward the periphery of the enlarged and cystic cells. Similar changes were found in the retinal pigment layer, speaking for a degenerative change in the cells which would explain a disturbance of function. Sala found very much the same conditions in naphthalin-cataract.

By one of those peculiar coincidences which occasionally favor us simultaneously with a number of similar rare cases, I have been enabled to study, in the eye department of which I am in charge in the Olmütz County Hospital, four subjects of this affection, all of them young women, during July and August, and a fifth, a young man, in October. The last case would probably have been overlooked had the others not already attracted my attention to the matter. He was admitted for double zonular cataract, and his voluntary statements contained no remarkable data, which had to be elicited by interrogation. I then realized the truth of Schmidt-Rimpler's dictum, that "specific questions must be put to the patient with cataract, as they are not apt of their own accord to come out with the statement that they have had . . . convulsions."

The patients are not aware of the possible connection between the visual disturbance and cramps, which generally occurred long before, and for this reason make no mention

of the latter. This circumstance alone explains why the equally important and frequent etiological factor of tetany was overlooked so long, and is still, undoubtedly, overlooked in many cases. It may be permitted to report my own cases somewhat more in detail, as they present a number of peculiarities, and the number of those already published (about twenty) is not large.

CASE 1.—Franziska K., aged thirty-two, laborer's wife, admitted June 26, 1904.

The family physician, Dr. Kostka, in Hustopetsch, writes: "Mrs. K. consulted me on Dec. 23, 1903, for painful tonic spasms of both forearms and hands, which subsided in two or three days. On Feb. 22, 1904, she was confined, without medical assistance, and felt well until March 1st. On this date she had high fever and general tonic convulsions. Her malady made so deep an impression on her people that the last sacrament was administered." Dr. K. could find no changes in the viscera, and attributed the convulsions to a spoiled stomach, the patient having eaten a large amount of sourkraut. On March 3d, she had no more fever, and the convulsions had entirely ceased. The child died, fourteen days after birth, in convulsions, probably caused by intestinal catarrh.

The patient added to this history the statement that, after having been discharged from treatment, all her hair and several finger-nails fell out. At the same time she noticed a diminution of vision in the right eye, which has become rapidly worse in the last three weeks.

Present Condition.—Somewhat anæmic, poorly nourished. Internal organs negative. Urine free from albumin and sugar. Hair short, as if cropped. Deep furrows are seen in the nails of thumb, index, and middle finger of both hands, indicating an antecedent loss of the nail. The toe-nails had not been affected. Appetite poor; feels weak.

Both eyes appear normal externally. Pupils round, free, and react well.

O D: Anterior chamber shallow. Lens shows a gray, slightly pearly, opacity up to the anterior surface. Good perception of light. O S: Anterior chamber somewhat shallow. Lens transparent, except for one or two gray striæ in the anterior and posterior cortex. Fundus still visible and normal.

V = 0.5; Jäger No. 7.

June 30th.—Linear extraction, O D, without iridectomy.

July 11th.—The left lens is rapidly becoming cataractous.

V: O S $\frac{3}{60}$; Jäger No. 16.

July 12th.—Linear extraction, O S, without iridectomy.

July 26th.—Discission of secondary cataract, O D.

July 30th.—Discharged. Post-operative course without reaction. Both eyes perfectly pale. Right pupil clear black, round, free, slightly dilated. Left pupil round and free; still contains some remnants, which are undergoing absorption.

CASE 2.—Therèse H., aged twenty-six, single, servant, was admitted July 7, 1904.

Patient had given birth to a child fourteen weeks before. During pregnancy she had had convulsions which came on at intervals of about fourteen days. There had been no disturbance of consciousness during these attacks; the extremities were flexed and the tightly closed eyes turned to and fro. After the cramps stopped she had the feeling that "the eyes were larger." The family physician, Dr. Wolf, in Müglitz, writes that he had made a diagnosis of tetany and cataract during pregnancy. "No disturbance of vision occurred until after the onset of the convulsions. I accordingly attributed the development of cataract to the tetany."

Manual detachment of the placenta was followed by slight rise of temperature. The convulsions gradually disappeared during the lying-in period. The child died in convulsions when three days old.

After long-continued puerperal fever, the hair and nails fell out and vision became worse. She had always been well, previous to this.

Before her confinement the patient had fallen off very much, as she could eat almost nothing, so she claimed, on account of stomach trouble.

Present Condition.—Poorly nourished. No organic changes. Urine negative; the loss had only been partial. The old nails of all ten fingers have fallen off and the new nails show very plainly the furrows indicating that decay. On the first and fourth finger of the right and all the fingers of the left hand dried-up remnants of the old nail about to be cast off are seen. There are new nails on all ten toes, some of which also show remnants of the old nails.

In both eyes the anterior chamber is shallow; the lenses opaque, gray, pearly; good perception of light.

July 9th.—Linear extraction, O S, without iridectomy. Normal operation.

July 20th.—Linear extraction, O D, without iridectomy.

Aug. 3d.—Discharged. No reaction since operation. Both eyes pale. Both pupils round, free, black, and central.

V, O D = + 11, $\frac{5}{20}$; + 14, Jäger No. 5. V, O S = + 11, $\frac{5}{6}$; + 15, Jäger No. 2.

Nov. 12, 1904.—Re-admitted. After leaving hospital, patient again had cramps in the arms and digestive disturbances. Eyes found to be as at time of discharge. Squeezing the upper arm produces a typical contracture of the hands (Trousseau's phenomenon); tapping the cheek induces characteristic twitching of the facial muscles (Chvostek's phenomenon).

Nov. 14th.—Discission of secondary cataract, O D.

Nov. 18th.—Patient complains of cramps in the stomach, nausea, and the sensation of a foreign body in the region of the œsophagus.

Nov. 26th.—Discharged. O D, pupil round and free. A free black opening in the secondary membrane. V, O D = + 11, $\frac{5}{6}$; + 15, Jäger No. 12. V, O S, as above.

Case 3.—Anna V., aged twenty-eight, working girl, admitted Aug. 21, 1904.

As a child, had scrofulous glands of the neck and suffered from cramps in the hands and feet since her fourteenth year, having more frequent attacks during the winter months. Her physician, Dr. Karafiot, in Konitz, reports that she was under his care in 1900 for tetany, and in 1902 for severe typhoid which got well in six weeks. After this illness patient says she lost all her hair and all the finger- and toe-nails. Since then the cramps have not come back. Vision was first affected about eight months ago in the right, and a few months later in the left, eye.

Physical Examination.—Anæmic, small, frail, poorly nourished girl. Old indrawn scars of glands of the neck on both sides. Urine negative. Thyroid not enlarged. Other organs normal.

Both eyes externally normal. Macula corneæ, O D. Pupils react well to light. Both lenses completely and uniformly gray. Good perception of light.

Aug. 22d.—Linear extraction, O D, without iridectomy. Cortical masses expressed with difficulty and some retained.

Aug. 23d.—Warm applications t. i. d.

Aug. 24th.—Linear extraction, O S, without iridectomy.

Aug. 25th.—Hot moist pads to both eyes.

Sept. 12th.—Discharged. No post-operative reaction. Both eyes pale. O D, central free round pupil; secondary membrane.

V, O D = + 11, $\frac{5}{30}$; + 14, Jäger No. 13 (macula corneæ).

V, O S = + 11, $\frac{5}{8}$; + 14, Jäger No. 3.

Oct. 17th.—Re-admitted for discission of secondary cataract. No Trousseau phenomenon could be detected, and galvanic irritability was not increased. After the secondary operation, patient was discharged on Oct. 23d with the following vision:

O D, V = + 10, $\frac{5}{15}$; + 14, Jäger No. 3 (maculæ corneæ); O S, V = + 11, $\frac{5}{8}$; + 14, Jäger No. 1.

Case 4.—Marie U., aged twenty-eight, housewife, admitted June 28, 1904. A communication from her physician, Dr. Kunz, in Odran, that she was confined last on Jan. 23d of this year. The general condition was then good and there was no skin affection. The new-born child was well developed, well nourished, and had no breaking out on the body. About fourteen days later the patient developed an exanthema covering nearly the entire anterior surface of the thighs, abdomen, and breast, in the form of vesicles varying in size from a pin-head to a pea, some filled with clear fluid and others already collapsed. A symmetrical distribution of these vesicles on the two sides of the body was very noticeable.

There were no discoverable changes in the internal organs. Temperature, 39.2° C. Pulse, 120. No appetite. Marked thirst. Feels faint. The skin affection was looked upon as pemphigus.

To this history the patient adds that her illness ended with the falling out of all of her hair and all of the nails. She also admitted, but only after repeated, insistent questioning, that two years before, after the birth of a child, she had had violent cramps in which "the hands were drawn up and the fingers got stiff"; the legs were similarly affected. Already at that time a diminution of vision was noticed which steadily progressed, particularly after the last illness. Marked disturbance of sight of the left eye has been present since three weeks.

Present Condition.—Fairly strong and well nourished. Good color. Hairs short, measuring 2–3*cm*, as if recently clipped. All ten fingers show clearly the markedly curved newly-formed nails.

The remnants of the old nails are still attached to the toes and to the right thumb.

Both shins and the entire inner surface of the right thigh are deeply pigmented and dark-brown, while the skin about the right knee is of normal white color. Some dark brown spots appear on the left thigh, in the sacral region, under the left scapula, and on the left side of the neck. (Patient says that before her illness her skin was perfectly clear and white, and that she could not lie comfortably on her back while sick on account of the sore spots.) Urine negative.

Both eyes externally normal. In the anterior and posterior cortex of the right lens there are several punctate opacities. Red reflex with ophthalmoscope.

O D, V = fingers at 3 metres, Jäger No. 3.

In the left eye the anterior chamber is somewhat shallow; the lens uniformly opaque, gray, and slightly pearly. Good perception of light.

June 30th.—Linear extraction, O S, without iridectomy.

July 14th.—Discharged. Post-operative course without reaction. Eye quite pale. Pupil round and black. V, O S = + 11 D, $\frac{6}{9}$; + 14 D, Jäger No. 2.

Re-admitted Nov. 14, 1904, as V of the right eye had become still worse. After dilatation of the pupil a rather diffuse clouding of the anterior and posterior cortical layers can be seen, which is resolved by transmitted light into a mass of striæ and dots arranged radially and allowing the fundus reflex, but no details, to penetrate. V = fingers at 2 metres, Jäger No. 18. O S as above.

Nov. 23d.—Cataract extraction, O D. The extracted nucleus is fairly consistent, quite transparent, faintly yellow, and measures 8*mm* in diameter. The adherent cortex is almost clear. Patient is still (Dec. 4, 1904) under treatment.

Dec. 4th.—O D, V = + 10, $\frac{5}{12}$; + 13, Jäger No. 3.

Case 5.—Stefan W., slate quarrier, aged twenty-two, was admitted Oct. 1, 1904. Sight began to fail four years ago, and has gradually grown worse. Patient says that about seven years ago he suffered with periodical attacks of cramps in the hands and feet, due to overwork. The fingers were clinched, and hands and feet felt numb. At the time of the cramps, which were particularly frequent in the winter months, he was otherwise well. He has no knowledge of having simultaneously had gastric,

intestinal, or other disturbances. During the attacks of cramp he was always fully conscious and noticed repeatedly that his distant vision was very poor, but that he could see well near by. During one of these seizures his hair fell out completely; the nails were not affected. On account of the cramps he was obliged to give up hard work. His mother is also believed to have had cramps, but saw well. There is no history of eye-disease among the other members of the family. Patient formerly had exceedingly good vision for distance.

Present Condition.—Healthy-looking, well-developed man. No signs of rickets; teeth normal, except for some furrowing of the incisors; thyroid somewhat enlarged; viscera normal. Urine negative. Trousseau's and Chvostek's phenomena absent; no increase of galvanic irritability.

Both eyes externally normal. After dilatation of the pupil there is seen a zonular opacity of both lenses which in both eyes occupies the extreme periphery, being situated in a thin layer of the anterior and posterior cortex. In transmitted light the opacity appears to be composed of separate dots and spots and of radial striæ. The centre of the lens can be transilluminated, and is accordingly less or not at all opaque. Details of the fundus cannot be made out. The case is, then, one of cortical cataract; in other words, a peripheral zonular cataract.

O D, V = $\frac{5}{60}$, Jäger No. 5. O S, V = $\frac{5}{60}$, Jäger No. 3.

Oct. 5th.—Linear extraction, O D, without iridectomy. A soft, flat nucleus, of the color of honey, and of medium size, was delivered without other lens masses.

Oct. 11th.—Course devoid of reaction; no debris in the pupil, which is round and black.

V = + 11, $\frac{5}{12}$; + 14, Jäger No. 3.

Oct. 12th—Linear extraction, O S, without iridectomy. Broad section with lance-knife. Under moderate pressure a well-formed nucleus is extruded, which in passing through the section splits in half. The nucleus is exactly *7mm* in diameter, of a pale yellow color, perfectly clear, and so soft that it can easily be squeezed to a pulp between the fingers.

Oct. 24th.—Both eyes perfectly pale. Post-operative course normal. Pupils round, free, central, clear black. V, O U = + 10, $\frac{5}{8}$; + 14, Jäger No. 3.

The first four cases have a striking number of characteristics in common. The patients were all young, otherwise

healthy women of from twenty-six to thirty-two years of age, with negative personal and family history as to diabetes, heredity, traumatism, and previous ophthalmic or systemic disease. All stated quite definitely that they had formerly been well and had no knowledge of any relative having cataract.

In every case, however, an exhausting illness had preceded (child-bed, typhoid), terminating invariably in the complete or almost complete loss of the hair and nails. In every case, furthermore, there had been attacks of cramps, which, according to the typical description of the patients and the statement of the attending physician, were undoubtedly tetany seizures. At the time of admission these had, it is true, completely disappeared, so that galvanic irritability was not found to be increased, and Trousseau's phenomenon could no longer be demonstrated. In Case 2, alone, these two symptoms appeared in characteristic expression on the patient's re-admission. One patient had had occasional seizures since her fourteenth year; the other first suffered during pregnancy. We have every reason to assume that these were cases of tetany-cataract. In regard to their causation, the disturbances of nutrition, which appeared with striking uniformity, deserve closer attention than they have heretofore received. It is certainly remarkable that the trophic disturbances noted invariably affected epithelial structures (skin, hair, nails, lens). The pemphigus-like eruption with subsequent pigmentation in Case 4 is peculiarly significant, and points to a genetic connection. This falling out of the hair and nails occurred twice in one of Wettendorfer's cases, and is noted in the first case reported, that of Meinert. In his earlier publications Freund, and also Badal, described peculiar trophic disturbances of the skin of the hands, breast, and abdomen. Similar processes may have taken place in many other instances and have been overlooked on account of their slight degree. The theory of a causal relationship between nutritional disturbances and cataract is, by the way, an old one. Most text-books state that exhausting disease, numerous births, etc., predispose to cataract. Senile cataract, itself,

is, in the last analysis, nothing but a product of a general disturbance of nutrition. The special trophic disturbances of epithelial structures in young persons are, however, something different, and it is perhaps *à propos* that neither they nor the lenticular opacities are mentioned in the descriptions of the clinical picture of tetany, as, for instance, that by Eulenburg in his *Real-Encylopædia* (edition of 1900). As an etiological factor we have furthermore to consider the tetanic cramps to the extent that they also affect the ciliary muscle. Spasm of accommodation has been repeatedly observed in tetany. One of my patients (Case 2) described quite graphically how her eyes turned to and fro and were tightly closed. The spasm of the external ocular muscles was, at all events, accompanied by contracture of the intrinsic muscles. My Case 5 stated expressly that he saw badly at distance and quite well near by during the attacks, and other authors (Wettendorfer, Peters, Taksch, Kunn) have made similar observations. Freund noticed miosis during the attacks.

According to the generally accepted theory, tetany is caused by toxines circulating in the blood, enterotoxines due to gastric or intestinal affections, or abnormal products of metabolism due to changes in other organs (goitre extirpation, gravid uterus) which induce a convulsive neurosis characterized by an increased state of irritability without organic lesions.

According to Weiss, the pathological basis of tetany is a state of irritability in the gray matter of the cord and medulla due to a disturbance of vaso-motor innervation, which is continuously present in a mild degree and at intervals becomes excessive. Other authors, as H. Schlesinger, attribute the functional disorders to vaso-motor imbalance, and from these to trophic disturbances is not a far cry. It is natural that the latter occur, for instance, in the convulsively clenched fingers, as expressed in necrosis of the nails. The analogy with ciliary spasm and subsequent cataract is striking.

Further investigations may possibly show that those cases of tetany which lead to trophic disturbances of the skin and

its adnexa are just the ones which predispose to the development of cataract. The dying of hair and nails must have been preceded by changes, based on vaso-motor disturbance in the organs (nail-bed, hair follicles) from which these structures obtain their nourishment.

An equivalent is seen in Peters's degenerative changes in the ciliary epithelium upon which the nutrition of the lens depends. However, just as the hair and nails may fall out without antecedent convulsions, simply as a result of other nutritional disturbances, *e. g.* after typhoid, changes in the ciliary epithelium similar to those above cited may cause cataract where no convulsions have occurred. In this category we must place diabetes, naphthalin intoxication, and senility, showing that we must not lay too much stress on the factor of ciliary spasm as against disturbance of nutrition.

On Sept. 21st of this year a wood-cutter's wife of forty-five with double cataract was admitted by me. The woman was prematurely aged, had had thirteen children, the last, three years before. During the last confinement she had had painful cramps in the hands and feet, the fingers had become stiffened in the position of an accoucheur; there were respiratory distress and headache. These cramps had, however, come on, it is said, only three times in all. Since this spring loss of vision has been noted.

It is probable that there were tetanic convulsions in this case, too, but the cataract-formation is much more simply explained by the combined nutritional disturbances, by changes due to pre-senility, than by convulsions which only occurred three times in all.

Case 5 differs in many respects from the preceding. In this case, too, the patient stated that there had been complete loss of hair. In the personal history of this vigorous young fellow of twenty-two, no etiological factor could be found for the causation of tetany, with the exception of severe physical labor in the slate quarries, which brought on the attacks again and again. Even hard work can only be accepted as a cause of disease if we assume an underlying predis-

position. This may have been of a congenital nature, as the patient's mother, it was stated, had also suffered from cramps. A further important distinction of this case from those of the women was the character of the lenticular opacity. In the former there was complete or almost complete clouding, which developed rapidly from zonular opacities, as could partly be observed, while in the male patient there was a punctate opacity of only the most peripheral cortical layer, and this appeared to be stationary. Vision, accordingly, was still comparatively good, and at operation the soft and entirely clear, yellowish lens, *7mm* in diameter, was pressed out like a fruit-kernel through the large keratome section. Macroscopic examination showed no trace of a beginning nuclear sclerosis, as was to be expected from the age of the patient, but the lens *in toto* appeared somewhat tougher and thinner. The character of this zonular opacity affecting the most peripheral layer, seems not to accord with Peters's hypothesis of a development of the cataract from shrinkage of the nucleus, which would lead us, on the contrary, to expect a clouding of the more central layers with a clear cortex in the lenses of a man of twenty-two years. For Peters claims (p. 40) that in those cases in which the nuclear sclerosis could barely be indicated, rapid increase in density of the nucleus produces a series of oval spaces at its periphery, while the elastic cortex yields sufficiently to follow the traction of shrinkage and is but slightly changed, if at all. The opacity noted in my case would presuppose, on Peters's hypothesis, an advanced nuclear sclerosis, which actually did not exist. Such a process, by interfering with or completely stopping the nutritional supply, causes intercellular fluid to be expressed, which then collects at a point where the sclerosis ends—that is, a more peripheral layer; if a juvenile lens is affected by an equally active shrinkage, the zone of opacity lies in the region of the nucleus. The above-cited case stands in evident contradiction with this theory, as the zonular opacity was not located at the periphery of a possibly differentiated, or at all events small, nucleus, but in the extreme periphery of the cortex. I fail to see how a nuclear shrinkage could explain the

development of opacity, at least in this case, but believe there was a moderate shrinkage, due to loss of fluid and decreased nutritional supply, of the entire lens which on extraction was found to be of increased consistency and somewhat small. The question naturally arises why the densest, dryest, and at the same time deepest portion of the lens, namely, the nucleus, should shrink first and most under the influence of diminished nutritional supply and an isotonizing loss of fluid to the saltier aqueous.

If the lens is nourished by osmosis, it is to be expected that the soft, watery cortical layers would be the very first to be affected, and would be altered most markedly by the qualitative changes in the aqueous. Why should the nucleus first contract by expression of fluid and thus induce a separation from the cortex? Is it not much more rational to assume that the cortex shrinks first and that it is this layer which breaks loose from the nucleus, forming the spaces and fissures described by Peters? An increase of the salt content of the aqueous must naturally act upon the lenticular structures from without toward the centre. The theory, thus amplified and corrected, would explain the peripheral opacities in Case 5. I am unable to decide how far it applies to my other cases. The condensation of the nucleus (situated, as it is, most unfavorably for nutrition), which takes place as a physiological process due to senile changes, must be looked at from another point of view, if only on account of the extremely gradual development of the sclerosis, and the genesis of senile cataract is probably quite a different one.

In this class of cases the nuclear shrinkage incidental to condensation might well produce a separation of this region from the cortical layers and thus cause the formation of clefts and spaces at the periphery of the nucleus. Tetany-cataracts, on the other hand, develop with unusual rapidity. In common with other authors (Freund), I have observed a strikingly sudden development, such as is never seen in senile cataract, and could only be possible, say, in diabetes, leaving out of the question traumatic forms, which develop under entirely different circumstances. In this connection

I may cite my first case, in which the left lens was transparent except for a few gray striæ, fundus easily seen, and V = $\frac{5}{6}$, on June 27th, while on July 11th, only fourteen days later, V = $\frac{3}{60}$, and the lenticular opacity was so advanced that I was able to proceed with extraction.

I have, in conclusion, to say a word or two about the course of healing. In every case, ten eyes altogether, I performed immediate extraction after simple linear section with keratome, without preparatory iridectomy or discission as is often done in these cases. The subsequent events justified this procedure. The eyes remained pale after operation, without a single exception, so that the absence of even the slightest post-operative irritation was particularly striking. Secondary cataract requiring discission was observed in three cases; in only one, however, were lens masses retained to any considerable degree. The visual results were uniformly excellent. Preliminary operations might only have caused complications, and would certainly have lengthened the period of healing.

POSTSCRIPT.

While this article was in press, another analogous case was admitted to my department, which is appended to complete the series.

Case 6. — Anna P., aged forty-one years, wife of a stone-quarrier, of Gross Waltersdorf, was admitted on Oct. 30, 1904.

Previous History.—Diminution of vision of right eye during four to five years, of left eye for a year. Patient has given birth to eleven children. During the last six pregnancies she regularly suffered with cramps lasting for several months, the most recent being in the spring of this year. The fingers at that time were stiff and almost clenched, the thumb outside, arms flexed, legs extended; there was twitching of the eyelids. The cramps were very painful, lasting up to half an hour, without disturbance of consciousness, came on two or three times a week, generally at night, particularly after a day of hard work. These cramps always began soon after the beginning of pregnancy and disappeared spontaneously after confinement. They never occurred except during pregnancy. Invariably, after these attacks

of cramps the finger-nails fell out and there was partial loss of hair. This occurred six times in succession.

Present Condition.—Patient appears prematurely aged. Front hair scanty. Some teeth missing, others carious. Newly formed nails on all ten fingers, the lower half showing furrows to which the old nails had been attached. Remnants are still found on the right thumb-nail in the form of a superimposed slate-colored horny layer. No changes noted in the viscera. No Trousseau phenomenon. Galvanic irritability not increased. Urine negative.

Both eyes externally normal. Light reaction of pupils prompt. Lenses gray, markedly opaque; indications of sector-like opacities in the right. Perception of light still present.

Nov. 2d.—Linear extraction, O D, without iridectomy. The lens came away complete, and looked just like a common senile cataract with a marked whitish opacity of the nucleus and very little cortex. The nucleus measured 8 by 3*mm*, was slightly sclerosed, and could easily be squeezed to a pulp.

Nov. 9th.—Linear extraction, O S, without iridectomy. Nucleus quite opaque, whitish.

Nov. 22d.—Patient discharged. Right eye perfectly pale. Pupil round and black.

V = + 10, $\frac{6}{8}$; + 14, Jäger No. 3. Left eye shows signs of ciliary injection; pupil slightly oval, transversely, and black. V = + 11, $\frac{6}{10}$; + 14, Jäger No. 5.

The observation of six cases of tetany-cataract in the short period of four months is sufficient evidence that this affection is by no means a rarity. The remarkable uniformity of the five cases in females, with regard to necrosis of the nails, loss of hair, and development of cataract after tetany, shows that the coincidence of these symptoms is, as I have already stated, more than fortuitous. The entire complex of nutritional disturbances seems to be the expression of a deleterious action of toxines on the nutritive organs of these various epithelial structures, the cramps of the hands, like those of the ciliary muscle, playing a concomitant but not a causal rôle.

REPORT OF THE THIRTY-SECOND MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF HEIDELBERG, AUGUST 3–5, 1905.

REPORTED BY DR. TREUTLER, OF DRESDEN.

Translated from Vol. LII., German Edition, September, 1905, by Dr. MATTHIAS LANCKTON FOSTER.

FIRST SESSION, AUGUST 3D, 9 A.M., DR. LANDOLT PRESIDING.

1. HEINE (Breslau). **Treatment of glaucoma.**

After having performed the operation twenty-six times for various forms of glaucoma, HEINE believes that by cyclodialysis a communication is restored between the anterior chamber and the suprachoroideal space, and that by this operation the intraocular tension may be greatly reduced, either at once or in the course of a few days, whether much, little, or no aqueous has escaped from the scleral wound. This seems to be the result even when several iridectomies or sclerotomies have been unsuccessfully performed, as well as in absolute glaucoma with marked secondary changes. The operation is easier to perform than a difficult iridectomy, and is applicable in cases in which an iridectomy cannot be properly performed on account of peripheral agglutination of the iris, and is also less dangerous, especially in buphthalmos. Symptoms of irritation sometimes follow the operation, but disappear in a day or two under medical treatment. Sometimes hemorrhages take place into the anterior chamber, either during or after the operation, but these are quickly absorbed. Detachment of the retina was observed in only one case.

DISCUSSION.

SATTLER thought that the suprachoroideal space might act vicariously for the normal excretory passages. The lymphatic

emissaries to Tenon's space, described by Schwalbe, do not exist. The lowering of the tension after this operation seemed to him to be due to filtration through the scleral wound or scar.

UHTHOFF held, in contradiction to Sattler, that the suprachoroideal space is obliterated in glaucoma, and he confirmed Heine's good results. The recovery of a glaucoma with bullous keratitis was particularly prompt. He employs this method only in cases in which eserine has been used for two days.

CZERMAK had operated on a case according to this method fourteen days before and the result thus far was satisfactory. He recommended that cyclodialysis take precedence over iridectomy in cases of glaucoma with atrophy of the iris. The lowering of the tension may be due to the separation of the iris from the ligamentum pectinatum.

AXENFELD had seen a glaucomatous excavation disappear after spontaneous detachment of the choroid.

FUCHS has observed an obliteration of the suprachoroideal space only once and that was in a case of sympathetic ophthalmia. The post-operative hemorrhages cannot be explained on the theory that Schlemm's canal was involved as that would be anatomically incorrect.

SIEGRIST has performed this operation three times. The first case did well (four weeks); no effect was produced in the second; the third was lost from intraocular hemorrhage.

In reply to a question, HEINE stated that his cases had been under observation for periods varying from four weeks to six months.

2. A. BIELSCHOWSKY (Leipsic). **Latent disturbances of equilibrium of the eyes.**

BIELSCHOWSKY ascertained from an investigation of about four hundred cases that there is no higher percentage of disturbance of the vertical and horizontal equilibrium of the eyes in neuropathic than in healthy persons. The theory, first advanced by American authors and advocated in Germany by Schoen, that such imbalance, particularly vertical, may give rise to various nervous diseases, is untenable. Marked heterophoria is present in healthy persons who have no such troubles, so that A. von Graefe is right when he says that the absolute degree of the ocular disturbance is in no way proportionate to the asthenopic and nervous troubles, whether the latter arise from it or not. The dependence is rather on the working capacity of the organism, especially of the nervous system, which varies individually.

3. VON PFLUGK (Dresden). **Technique of operations for strabismus: advancement and tenotomy.**

This author has calculated that in the normally formed eye a change in the direction of the visual line of 5°, either nasally or temporally, corresponds to a change of the position of a point on the limbus corneæ of about 1.1*mm* (10° = 2.2*mm*, 15° = 3.3*mm*). If the insertions of the internus and externus are moved proportionately toward and from the limbus, the axis of the eye may, within certain limits, be turned toward or from the nose without shortening or lengthening a muscle or tendon. The angle of strabismus is measured with due allowance for the angle γ, and the calculated distance is marked off on the sclera. The operation is easily performed without general anæsthesia. A conjunctival flap is formed, with its base toward the cornea, over the insertion of the muscle, so as to lay bare the muscle and tendon for a distance of 15*mm*. The location of the new insertion is marked and the scleral surface at that point freshened; the tendon is cut close to the eyeball, sutured in its new place, and the conjunctival wound closed. Both eyes should be bandaged for seven days and atropine continued for fourteen days longer. He has used this operation as yet only in pure cases of concomitant strabismus and it has proved satisfactory in the slighter degrees.

DISCUSSION.

HALBEN reported a case in which after a traumatism to the skull, in the region between the angular gyrus and the supramarginal gyrus, a right hyperphoria of from 9° to 13° developed in addition to various other disturbances. An enormous power of vertical fusion was established vicariously, according to Halben's assumption. Tenotomy of the right superior rectus produced asthenopic symptoms. In response to Bielschowsky's conjecture that the case was one of paralysis rather than of hyperphoria, Halben emphasized the concomitant character of the disturbance of equilibrium, and the equality of the hyperphoria in all portions of the field.

FUCHS said that the scleral sutures are most important in the production of the effect in advancement. They should pass through not only the episcleral tissue but the entire sclera.

SATTLER spoke of the possibility of so gauging an operation that the setting forward or backward of a tendon so many millimetres would correspond to so many degrees of strabismus. In

tenotomy he avoids too great a retraction of a muscle by passing a thread through its tendon previous to cutting it free. In advancement he always carries the needles through the superficial layers of the sclera. He seeks to obtain a certain amount of over-effect because there is always some retrogression after both eyes have been bandaged for five days.

4. ELSCHNIG (Vienna). **Parenchymatous keratitis.**

ELSCHNIG described the anatomical condition found in the eyes of an eight-year-old child, who had suffered from typical parenchymatous keratitis for seven weeks in one eye and three weeks in the other. The fixed corneal corpuscles divide and in the lymph spaces appear several irregularly formed nuclei with occasional round cells. Then the cells swell, the nuclei are destroyed, while the lymph spaces become greatly distended with a finely granular detritus and numerous fragments of nuclei. In the most diseased portions there was a necrosis of the lamellæ. Repair took place through proliferation of the fixed corneal corpuscles with or without new-formation of blood-vessels. At first the nuclei of the newly formed cells lie irregularly in the spongy remains of the ground substance, and later obtain a superficially parallel arrangement and a new ground substance. Such reparative collections, with true giant-cells and similar cells containing numerous nuclei, were close beneath Bowman's and Descemet's membranes. The changes in the uvea consisted of scattered, diffuse, and circumscribed collections of round cells. In the sclera there were the same changes, and also a formation of young connective tissue in the neighborhood of the obliterated vessels. The parenchymatous keratitis in this typical case was primary, apparently due to a nutritive disturbance in the cornea, probably caused by a change in the constitution of the tissue lymph (toxine of syphilis).

DISCUSSION.

STORCK mentioned that he possessed two specimens of parenchymatous keratitis in which Descemet's membrane was defective. AXENFELD suggested that the primary syphilitic changes might perhaps be called forth by the toxic influence of the hypothetical agent organism of syphilis. LAQUEUR adhered to the old view that there is no parenchymatous keratitis without development of vessels. BIRCH-HIRSCHFELD had obtained, experimentally, results similar to those shown by Elschnig. VON HIPPEL,

Jr., pointed out that in the early stages of parenchymatous keratitis Descemet's membrane was intact because it could not be stained by fluorescin.

5. KRÜCKMANN (Leipsic). **Ophthalmoscopic and clinical studies of the neuroglia in the fundus.**

By means of studies of the embryo the author has determined that the peripheral glia mantle of the optic nerve enters the eye, and appears in the retinal layers with offshoots into the intermediate tissue and the so-called limiting tissue. Hence he declares that the glia mantles, of mesodermal tissue, found by Held in the central nervous system are present in the optic nerve and retina, and makes a distinction between a superficial limitans and a perivascular limitans. The author distinguishes an anterior and a posterior glia ring and glia reflex, discusses the grayish-blue discoloration of the papilla which is visible ophthalmoscopically after proliferation of the glia of the papilla, and delineates the union between the pigment epithelium and the retinal glia cells. The black margins of atrophic patches of retino-choroiditis in halo, conus, and disseminated choroiditis are described as epithelio-glial zones with coincident pigmentation of the neighboring glia cells. Retinitis pigmentosa is indicated to be a gliosis with secondary pigmentation of the protoplasm of the glia cells. The absorption of fuscin corpuscles through the glia cells is discussed histologically and ophthalmoscopically. The formation of fatty granular cells is ascribed mainly to the neuroglia in connection with vascular diseases. Finally the author mentions the new-formation of glia fibres which appear ophthalmoscopically in chronic diseases as perivascular glia mantles.

DISCUSSION.

SCHIECK mentioned a case of Korsakow's disease in which white spots were present in the retina, typical of nephritis, though renal disease was not present. In reply to a question how the stellate figure in nephritic retinitis was to be explained, Krückmann pointed to the radiating course of the small vessels about the macula and stated that he thought the stellate figure to be the impression made ophthalmoscopically by an arterio-sclerosis of their walls.

6. GREEFF (Berlin). **Parasites of the lens.**

Between 1822 and 1833 several articles appeared on the occur-

rence of filariæ and trematoda in the lens of the human eye, but since that time no such observations have been made and the old papers have been discredited or ignored. Trematoda are often met with in the lenses of certain regions and cause epidemics of cataract, as is well known to fishermen. The ova of trematoda in the intestines of certain sea-birds are dropped into the water with the bird's excrements, the young larvæ are taken into the intestines of the fishes, whence they enter the blood current, and finally penetrate into the eyes. The author has also found two dead, shrivelled larvæ of the trematoda in a monolateral cataract removed from a fisherman. He considered that they were certainly the cause of the cataract, and that they had probably been taken into the body of the patient when he was drinking the water of the lake.

DISCUSSION.

VON HOFFMANN had observed an epidemic of cataract in five children, and PIESBERGEN had frequently found varieties of distoma in the eyes of the pike.

7. UHTHOFF (Berlin). **The ocular symptoms in epidemic cerebro-spinal meningitis.**

UHTHOFF reported the results of an investigation of 110 cases during the recent epidemic in Upper Silesia in which thousands of patients, mostly children, were attacked and in which the mortality was 50 per cent. In addition, he mentioned five cases of severe ocular complications observed at the Breslau eye-clinic during the same epidemic, and two cases in which the ocular complications were found on autopsy. The conditions found in the 110 cases were optic neuritis 17 times (one case monolateral), metastatic ophthalmia 4 times, keratitis 3 times (twice with deep infiltration of the cornea, once keratitis e lagophthalmo), conjunctivitis once as the result of lagophthalmos, muscular anomalies 15 times (8 cases of paralysis of the abducens, 2 of them bilateral, 1 case of ptosis, 5 cases of conjugate deviation, 1 case of total ophthalmoplegia), pupillary anomalies 8 times (5 cases of no response to light with relatively small pupils, usually associated with unconsciousness, 3 cases of fixed pupils of medium size, partly in association with amaurosis, several cases of anisocoria), nystagmus 8 times, usually not typical, but rather convulsions resembling nystagmus with irregular wanderings and oscillatory movements. In some cases the closure of the lids was much

enfeebled and allowed an abnormal gaping of the palpebral fissure. In one case there was spasm of the orbicularis.

Uhthoff then considered the symptoms separately and referred to the literature on the subject. The almost complete absence of choked disk in the optic neuritis was dwelt upon and the anatomical preparation of a case was shown. Only slight symptoms of retrobulbar perineuritis were present, and there was no descending neuritis or perineuritis. There were 8 cases of metastatic ophthalmia, with the 2 found on autopsy, one a case of metastatic retinitis, the other of metastatic irido-choroiditis. The author had found experimentally that the material obtained from the eyes of rabbits blinded by metastatic ophthalmia proved only lightly virulent and that the bacteriological examination proved negative. The author then discussed metastatic ophthalmia generally, and concluded with brief remarks regarding the other symptoms.

DISCUSSION.

NIEDEN referred to his experience in the epidemic of 1870–71, in which there was a lower percentage of both the mortality and the ocular affections. He called particular attention to the abortive forms which were numerous in that epidemic and were valuable from a diagnostic standpoint, because often the ocular disease, metastatic irido-choroiditis, formed the single characteristic symptom of the disease. No doubt was possible in these cases of the existence of a latent cerebro-spinal meningitis.

8. STOCK (Freiburg). **Ocular changes in leukæmia and pseudo-leukæmia.**

STOCK briefly described leukæmia and pseudo-leukæmia, called attention to the fact that these diseases belong to the same category as they can be differentiated only by the condition of the blood, and then dwelt on the differentiation of lymphosarcoma. A lymphosarcoma is a malignant tumor composed of small cells, resembling lymph cells, which usually appears primarily on the head and spreads rapidly by metastasis through the entire lymphatic system. Acute lymphoid leucæmia was then described and differentiated from the clinical picture of leuco-sarcomatosis. In the latter large unripe leucocytes with large badly staining nuclei and little protoplasm are present in the blood. He then reported the following cases:

1. A chronic lymphoid leukæmia of the typical "facial type," in which the lymphatics of the head had been particularly affected

and had caused bilateral exophthalmos, bilateral swelling of the lachrymal glands, and glandular swellings in the region of the parotid. The tumors retrograded under treatment with arsenic.

2. A case of monolateral exophthalmos in which the diagnosis of pseudo-leukæmia with retrobulbar tumor had been made and in which improvement had followed treatment with arsenic. At the autopsy a lymphosarcoma of the sphenoid was found, together with metastases throughout the lymphatic system. In this patient one pupil failed for a long time to respond to reflexes, a phenomenon which the author was inclined to ascribe to an isolated injury of the oculo-pupillary fibres.

3. A case of acute lymphoid leukæmia, with large, nearly symmetric preretinal hemorrhages, and a peculiar greenish-yellow discoloration of the retina about the largest hemorrhage in the region of the macula.

4. A case of leucosarcoma in which there were some retinal hemorrhages and an infiltration of the choroid with leucocytes. As there were no inflammatory symptoms present, the author considered this condition to be one of lymphoma of the choroid.

Finally the author showed that the changes in the fundus in acute leukæmia and in leucosarcomatosis are somewhat characteristic, and that perhaps a differentiation between these diseases could be made through the fundus, and also between them and septico-pyæmia, which bears a close clinical resemblance to both.

9. Birch-Hirschfeld (Leipsic). **Diagnosis and pathology of tumors of the orbit.**

There are diseases of the orbit which simulate orbital tumors, although neither a true tumor, syphilis, tuberculosis, leukæmia, pseudo-leukæmia, nor disease of the accessory sinuses is present. The author reports four such cases which he denominates pseudo-tumors of the orbit. In two of the cases no tumor could be found after Kroenlein's operation had been performed, and the anatomical cause of the exophthalmos remained obscure in spite of long-continued observation. In the two other cases the orbital tissue was found to be permeated with collections of lymphoid cells with numerous typical follicles. The presence of a general chronic inflammatory process was suggested by the vascular changes, the plasma cells, and the bilateral onset, but the author has observed that such changes occasionally take place in lymphangiomata of the orbit. He denominates the disease

disseminated lymphangiomata of the orbit from its anatomical characteristics and is inclined to think that it occurs more frequently than is usually supposed.

Discussion.

Goldzieher referred to a case he had published of symmetric tumors of the orbit, which on section proved to be syphilitic, although during life there was no history and no symptoms of this disease. Possibly the follicular proliferation through the orbits in Birch-Hirschfeld's cases might have been due to follicles which had penetrated into the orbit from the retrotarsal fold and had undergone further development there from some procatarctic cause.

Demonstration session, August 3d, 2.30 P.M. Dr. Peters presiding.

Specimens and instruments were exhibited to illustrate papers which had been read.

Discussion.

Deutschmann has seen a maintenance of the maximum dilatation of the pupil after the use of atropine in parenchymatous keratitis on three occasions. Elschnig believed that this must be ascribed to atrophy of the sphincter.

10. Krückmann. **Pathological anatomy of myopia.**

Some choroidal changes were described in a case of high myopia which had been under the author's care for several years. Colored sketches had been made at different times of the ophthalmoscopic picture. The so-called lightning figures were shown to be obliterated veins. The displacement of the chromatophores by stretching and dislocation of the vessels was compared with histological preparations and decided to be simply the result of tension.

11. Stock (Freiburg). **Further researches regarding hematogenous tuberculosis of the eye in rabbits.**

Stock first showed that, as a result of tuberculous infection of the blood, choroiditis disseminata and iritis were produced, which tended to recovery, but were prone to recur. A portion of the iris was removed from an animal in which the iritis appeared to have been cured. No tubercle bacilli could be found in it, but

a typical, cheesy tuberculosis developed in the eye of a second animal in whose anterior chamber the piece of iris was implanted. By this it was demonstrated that the relatively mild course of the iritis and disseminated choroiditis was due to the infection coming from the circulation, and not to the virulence of the tuberculous material used for inoculation, and also that in an iris which appears to have recovered after such an inflammation, tubercle bacilli remain which will bring about a recurrence when opportunity offers. This is a condition which resembles that of chronic iridocyclitis, which runs a very similar course in human beings, and it is suggested that this disease may be a tuberculosis which runs a relatively mild course, because it is hematogenous.

STOCK also demonstrated **a deep scleritis,** produced by infection of the blood with tuberculosis. The specimens showed how the inflammatory process extended from the choroid to the sclera, which it had thinned and caused to bulge. In only one was there a cheesy deposit in the sclera. The etiology of many cases of scleritis in man is still obscure. This experimental finding, together with the fact that vitreous opacities occur in connection with deep scleritis, indicates that in the scleritis met with in man the process starts in the choroid or ciliary body, involves the sclera secondarily, and is nothing else than a hematogenous tuberculosis.

12. BIRCH-HIRSCHFELD. **Paraffin sections of the sclera of a highly myopic eye which showed an abundance of elastic fibres.**

13. HESS and ROEMER exhibited a baboon, in which the clinical picture of trachoma had been produced by rubbing freshly expressed trachoma granules into its conjunctiva, together with macroscopic and microscopic specimens taken from another successfully inoculated case.

14. TH. AXENFELD (Freiburg). **Demonstration of the intra-epithelial bacilli found by Major Herbert, of Bombay, in keratitis punctata superficialis.**

Herbert had found in a superficial punctate keratitis endemic in India, which at any rate closely resembles the form met with in Europe, great numbers of peculiar encapsulated bacilli in the epithelia covering the gray deposits, which were difficult to stain and therefore easily overlooked. Although they cannot be cultivated, their etiological relation to the keratitis is very probable because they are regularly present and do not conform to any

other known kind of bacteria. The specimens had been sent him for his opinion, and he recommended them for consideration. It was conceivable that the peculiar nests of hyaline fibrin beneath Bowman's membrane, described by Nuel, were also due to infection of the epithelium. The therapeutic indication seemed to be an abrasion of the cornea.

15. TH. AXENFELD (Freiburg). **Cavernous or lacunar atrophy of the optic nerve and spontaneous dehiscence of the sclera in high myopia.**

AXENFELD demonstrated in two eyes with 30 dioptres of myopia and marked chorio-retinal changes, that there was "cavernous" atrophy of both optic nerves. The septa were greatly thinned, and the interspaces dilated and filled with loose glia and fluid. This condition differs widely from that of ordinary atrophy of the optic nerve, and had been ascribed by Schnaudigel to hemorrhages. In these cases it seemed to be rather a progressive atrophy. He referred to Schnaubel's view, that the formation of such lacunæ was responsible for the origin of glaucomatous excavations, but no such excavations were present in these specimens, although spaces had been formed clearly behind the lamina cribrosa. The sclera of the posterior section of the eye was greatly thinned and showed several apertures, so that when the globe was freshly enucleated its interior could be looked into from behind. The lamina cribrosa was interrupted in places, and there was an extremely high degree of myopic atrophy from tension.

16. BIELSCHOWSKY. Demonstration of a **stereoscope with removable plate-holders**, cheaper than other apparatus constructed on similar principles.

17. BEST (Giessen) exhibited microscopic specimens of **diabetic eyes, with special reference to the glycogen they contained.** Glycogen is to be found in the eye only when there are present pathological conditions which produce changes of assimilation, such as inflammation, suppuration, circulatory disturbances, and the healing of wounds, and in these the glycogenic infection corresponds to the degree of the inflammation. It can also be found in diabetic eyes which are not inflammatory. The eye must be numbered among the organs specifically susceptible to the glycogen infection.

18. E. v. HIPPEL (Heidelberg) exhibited specimens of a **congenital microphthalmos with complete aplasia of the**

optic nerve, in which a tumor sprang from the retina. The tumor was not histologically glioma, but a benign tumor, springing from the glia. The principal interest of the case is that it should be considered identical with Helfreich's, hitherto the only reported one of the coincident occurrence of microphthalmos and glioma.

19. WAGENMANN (Jena). (*a*) **Perforating ulcer of the cornea, with commencing escape of the lens, in an eye with absolute glaucoma.** The luxated lens must have turned, and was so wedged into the perforation that the temporal margin of its equator protruded from the eye. The capsule over the prolapsed portion was burst; the nucleus was swollen.

(*b*) **Pathological anatomy of traumatic cataract.** In an eye with a fresh perforating wound of the cornea and incarceration of the pupillary margin of the iris, the corneal wound had begun to be closed anteriorly by an epithelial plug. There was a circumscribed perforation of the lens capsule, with moderate destruction of the lens fibres in the wound. At the end of the wound in the capsule there was a circumscribed swelling of the lenticular epithelium as the first stage of closure of the wound in the capsule. The epithelium was thickened laterally from the wound. The lens fibres in the region of the wound in the capsule were separated by fluid; laterally there was fluid between the epithelium and the body of the lens, and likewise between the lens fibres at the equator and in the posterior cortical.

(*c*) **Sarcoma of the choroid, with marked hemorrhages in the tumor and in the subretinal space, and with hematogenous pigmentation in the nerve.** A deep reddish-yellow reflex, obtained in an eye with glaucoma, caused the presence of a tumor to be suspected. Enucleation, not exenteration, was performed. Within the eye was found a sarcoma of the choroid, with extensive hemorrhages both on its surface and in its interior. In the nerve was marked infiltration, with hematogenous pigment.

20. VELHAGEN (Chemnitz) exhibited an **embolism of the central artery of the retina,** in which the cilio-retinal vessels with the corresponding part of the retina between the papilla and macula remained unaffected. The patient was a man, forty years of age, who had heart disease, and had an attack of aphasia synchronously with an embolism in the left eye. Death at the end of three months. The cerebral layer of the

retina was necrosed. At the macula there was an abrupt transition from normal retina to a destroyed layer of rods and cones. The retinal vessels were smaller than normal, but otherwise unchanged. There was no trace of infarction. The specimens which exhibited the optic nerve behind the lamina cribrosa were very striking. While all else was atrophic, a wedge on the temporal side, which contained the papillo-macula fibres, remained almost perfectly preserved. If the macula fibres had taken part in the ascending atrophy, as seemed probable, it was plain that they did not pass to the periphery of the nerve behind the globe, but in the neighborhood of the central vessels.

21. SCHNAUDIGEL (Frankfort). **Neurofibrillæ in the ganglion cells of the retina.**

The author has investigated more than fifty fishes' eyes by Cajal's method, and found most beautiful ganglion-cell fibrils in the retina of the shark. The entire fresh eye of the fish was fixed in ammoniacal formol, and, after eight days, impregnated for three days in an incubator. The best temperature was found to be 35° C., and the best solution a 2 % solution of silver nitrate. They were then placed for twenty-four hours in a 2 % solution of pyrogallol, which may be replaced by formol, washed, dried, embedded, cut, and the sections fixed. The impression given is that not all the fibres react to the impregnation, and also that frequently several fibrils would be encrusted together.

22. SCHANZ (Dresden). **The mirror sight.**

SCHANZ exhibited, in Lucerne, a model for a sight adapted to the needs of elderly sportsmen. He now showed guns provided with his sights.

SECOND SESSION, AUGUST 4TH, 9 A.M., DR. GREEFF PRESIDING.

23. A. VON HIPPEL, Sr. (Goettingen). **Further experiences in the treatment of severe tuberculosis of the eye with tuberculin T. R.**

VON HIPPEL briefly reported the results he has obtained in fourteen additional cases of severe tuberculosis of the eye which he has treated since March of this year. Seven cases of tuberculosis of the uveal tract or cornea had recovered, four were still under treatment, and two had shown marked improvement. In none had the treatment seemed to be useless, and possibly a good supplementary influence is exercised, because after some weeks a retrogression of tuberculous nodules in the iris begins. In two

cases of severe tuberculosis of the conjunctiva, one was cured by the injections and no visible scar was left, the other was a failure and operative intervention became necessary. In a twelve-year-old Russian boy with tuberculosis of the iris, seven injections of tuberculin had been made by his physician under the conjunctiva, which had produced a rapid deterioration of the body with severe inflammatory symptoms. He urgently warned against such mistakes.

The method he recommends has proved suitable in the majority of cases, yet in some patients doses of $\frac{1}{100}mg$ produce greater and more prolonged reaction than desirable, and in such great care is necessary in the dosage. He recommends first to inject $1mg$ of old tuberculin to confirm the diagnosis. It is of great importance that the treatment should be prolonged sufficiently to secure a permanent cure. The author has seen once a slight recurrence even after sixty injections, and therefore recommends to his patients after their discharge that their physicians continue to make the injections for some time, the doses not to be increased. A permanent cure of one eye gives no guarantee against the appearance of disease later in the other eye. The general condition is favorably influenced in almost all cases by the tuberculin treatment. Swellings of the spleen and of the lymphatic glands retrograde and in many patients the bodily weight is increased. This means does not always result in recovery, but the results obtained are so good as compared with the ineffectiveness of any other treatment in severe tuberculosis of the eye that it is to be warmly recommended.

Discussion.

Sattler had obtained good results in four cases of tuberculous iritis and in two of tuberculous episcleritis. He injects from $\frac{1}{100}$ to $\frac{1}{2}mg$.

Halben described three cases of tuberculous iridocyclitis and keratitis successfully treated in this manner.

Czermak had obtained two cures out of eight cases. He had always used old tuberculin. Haab also had used only old tuberculin. Purtscher had used tuberculin T. R. in two cases: one was cured, the other improved.

24. Grunert (Bremen). **The only way to control myopia in schools.**

The author believes that only radical measures, such as not to

have children learn to read and write until they are from six to nine years old, a reduction of the number of subjects taught, and other general hygienic regulations, can have a real influence on the development of myopia, and recommended that action be taken by ophthalmologists along this line.

SATTLER doubted the possibility of carrying out these suggestions. SIEGRIST emphasized the importance of an early correction of astigmatism, which frequently is productive of myopia. STRAUB stated that from investigations among the school-children of Amsterdam it appeared that the cases of myopia increased in number and degree in proportion to the advancement of the classes, the grade of the school, and the diligence of the student. GOLDZIEHER suggested to study the influence of the kinds of instruction by means of parallel classes. GREEFF considered the general hygienic improvement of the schools to be of the main importance. VON GROSZ urged diminution of in-door work.

25. E. VON HIPPEL (Heidelberg). **Congenital lamellar and central cataract.**

The author had obtained congenital lamellar and central cataracts experimentally by the exposure of the abdomens of pregnant rabbits to the X-rays. Twelve experiments gave six positive, three doubtful, and three negative results. In all, thirty-four cataracts were obtained: typical central cataract ten times, typical lamellar cataract eight times, lamellar and central combined four times, a circular opacity of the anterior cortex with a transparent centre four times, while in eight it could not be determined with certainty whether the circular opacity enclosed the nucleus like a shell or belonged wholly to the anterior cortex. The central cataract in the newly born animals measured from .18 to .36*mm* in diameter; in the six-weeks-old rabbits about 1½*mm*. Anatomically the central cataract contained molecular detritus, chalky granules, and nuclear remains. In one of the lamellar cataracts there was a typical zone of drops; in the others the substratum of the opacity could not be made out with certainty. Study of the embryos gave no satisfactory result. From these observations it appears that an injury to the lens during intrauterine life may result in an opacity of the lens after a certain period of latency. The injury may affect only the part of the lens which has already been formed, or it may affect the parts which are formed later. In the latter case it is to be supposed that the descendants of the primarily injured cells receive an

inclination to pathological crumbling. It is thus experimentally shown that a central or lamellar cataract may have an intra-uterine origin.

PURTSCHER spoke of a case of partial lamellar cataract which seemed to him to have been caused by a local injury.

DISCUSSION.

26. F. SCHIECK. **Is there a true leucosarcoma of the uveal tract?**

The conception of a leucosarcoma of the uvea has undergone a great transformation. Formerly the term indicated a tumor apparently uncolored macroscopically, in contradistinction from the black melanosarcoma, but recently it has been made to include tumors which are histogenetically different from melanosarcoma, even though macroscopically stained, as in Kerschbaumer's "leucosarcoma with hematogenous pigmentation." The entire question of leuco- and melano-sarcoma has entered upon a new phase through Ribbert's consideration of melanosarcoma as a product of proliferation only of chromatophores, and the certainty that chromatophores, both physiologically and as tumor cells, pass through a young stage when they are free from pigment, so that the question really is whether or not all white sarcomatous tumors of the uvea are simply melanosarcomata with unripe pigment. The author has previously shown that in correspondence with Ribbert's theory of the return to the lower forms, the chromatophores in melanosarcoma may return in their development to the forms of non-pigmented round or spindle cells, and under certain circumstances can pass in the tumor from this embryonal stage through all the forms of the fœtal cell until they become fully formed, ramifying, and densely blackened pigment cells. The occurrence of non-pigmented round- and spindle-celled sarcomata of the uvea may thus be explained, while in other cases the appearance of angiosarcoma may be counterfeited by proliferation of the cells along the vessels. The attempt to distinguish certain sarcomata as hematogenously pigmented in comparison with melanosarcomata must be considered a failure, because the characteristics which have been adduced as showing the hematogenous nature of the pigment are simply symptoms of degeneration affecting the tumor cells of the melanosarcoma with the physiological chromatophores and pigment epithelial cells of the retina. He rejects the claim that

the isolated colored cells so frequently met with in white tumors of the uvea are remnants of the mother tissue, and shows that such cells only hasten the development of the still non-pigmented sister cells and are themselves pigmented, ripe tumor cells.

The writer then reviewed his own cases together with eighty-three gathered from literature, and was unable to find a single observation which was contra-indicative of the presence of a melanosarcoma, the pigment of which was mostly or entirely unripe. On the contrary, he showed that sixty cases taken from literature were cases of melanosarcoma, and finally concluded that true leucosarcomata of the uvea have not been met with.

DISCUSSION.

SATTLER agreed with the author in everything except his generalization. He has seen characteristic angiosarcoma of the choroid with cells resembling epithelium.

27. CZERMAK (Prague). **Pathologico-anatomical condition in the very rare retinal disease described by E. von Hippel.**

CZERMAK reviewed the clinical history of a case published in 1899. He had the opportunity to examine both eyes after the death of the patient and found a multiple proliferating angioma of the retina of congenital origin.

DISCUSSION.

DARIER and SCHLEICH described a case which was apparently one of the condition just denominated by Czermak angiomatosis retinæ.

28. H. BECKER (Dresden). **Hemorrhage threatening life persisting four weeks after a cataract extraction.**

A ripe senile cataract was extracted Oct. 10, 1903, from the right eye of a man seventy years of age, who had no demonstrable general arteriosclerosis or hemorrhagic diathesis, no albumin or sugar in his urine, and no myopia, syphilis, or signs of glaucoma. The hemorrhage began the instant the iris was seized with the forceps for the purpose of performing an iridectomy. The bleeding was principally arterial, and persisted for five days from the corneal wound in spite of pressure bandage, rest, ice, gelatine, etc. At the end of that time the eyeball was eviscerated because life was threatened. When the iodoform

tampon which had been placed in the scleral cavity was removed three days later, the hemorrhage recommenced with pulsations from the central artery of the retina. Pacquelin's cautery was applied to the artery, an iodoform tampon placed in the scleral cavity and the sclera sutured together over it. The bleeding persisted in spite of repeated injections of Merck's sterile gelatine into the thigh, and the application of adrenalin, iodoform, and xeroform, but was finally checked Nov. 10, 1903, after Merck's sterile gelatine dropped into the scleral cavity had hardened, exactly one month after the cataract operation. Inasmuch as hæmophilia, glaucoma, myopia, syphilis, retrochoroideal hemorrhage, anomalous course of the ophthalmic artery, and general arteriosclerosis were excluded, BECKER thinks that the cause of this very prolonged and dangerous hemorrhage was a local arteriosclerosis of the carotid artery and its branches, particularly the ophthalmic artery and its branches to the iris, and the central artery of the retina.

DISCUSSION.

FUCHS had seen a similar case which resulted in death. He recommended the use of a means to reduce the blood pressure, such as bromide of potassium, in patients with arteriosclerosis, and also that they sit both during and after the operation.

DEUTSCHMANN, PURTSCHER, and EVERSBUSCH mentioned similar cases, and confirmed the rarity of such complications.

29. DARIER (Paris). **The use of radium in ophthalmology.**

DARIER has successfully treated several cases of epithelioma and rodent ulcers with radio-active material, and has seen good results in trachoma. He spoke particularly of the anodyne effects of the Becquerel rays, which he had observed in cases of gastric crisis as well as in certain neuralgic pains in the eyes where the action of suggestion had been excluded. Vernal catarrh also was amenable to the radium rays.

DISCUSSION.

UHTHOFF had been able to compare the effects of radium with those of the means ordinarily employed in trachoma and follicular conjunctivitis in a number of cases, and denied that radium produced any special effect on trachoma.

(*To be continued.*)

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FOURTH QUARTER OF THE YEAR 1904.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the Assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and Others.

Translated by Dr. PERCY FRIDENBERG, New York.

Sections I.–III. Reviewed by PROF. C. HORSTMANN, Berlin.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

529. OLIVER, CH. **The ophthalmic subjects treated of in the code of Hammurabi.** ARCH. OF OPHTH., xxxiv., 1, p. 6.

530. ALBERTOTTI, G. **Reproduction of a portrait with spectacles painted by Tommaso of Modena in 1352.** Presented at the Internat. Congress of Ophthalm., 1904.

531. SCIMEMI, E. **History of the sense of color.** *Arch. of Ophthalm.*, 1904, xi.

532. SIMI. **Forensic ophthalmology.** *Bolletino d'oculistico*, 1904, part 2–3.

533. GONGE, A., and DELOGÉ, CH. **Hgyienic requirements in the treatment of eye disease in Algiers.** *Arch. d'ophtalm.*, xxiv., 10, p. 665.

534. ZAWROW, W. A. **The distribution of hemeralopia in the Russian, Tartar, Moldavian, and Tschuwaschian population.** *Wjestn. ophthalm.*, 1904, No. 6.

535. HATZIDAKIS, EMMAN T. **Trachoma in Crete.** *Annal. d'ocul.* cxxxii., p. 284.

536. BERRY, G. A. **The effect of accidentally diminished acuteness of vision on its efficiency.** *Ophth. Rev.*, 1904, p. 184.

537. ELIASBERG, J. **A contribution to ocular hygiene.** *Arch. d'ophtalm.*, xxiv., 12, p. 776.

538. WIDMARK, J. **Myopia in the Djursholm high-school, etc.** *Hygiea*, 1904, ii., p. 628.

539. SCHREIB, W. **The eyes of Tübingen school-children.** *Inaug. Diss.*, Tübingen, 1904.

540. COHN, H. **Truc and Chavernac's examinations of the eyes of school-children in Montpellier.** *Wochenschr. f. Ther. u. Hygiene d. Auges*, viii., No. 15.

541. COHN, H. **The reports of the municipal physician, Dr. Oebbeke, on the inspections by school-physicians during the school-terms 1901-1903.** *Ibid.*, viii., No. 18.

542. LEONHARD, EWIN. **Report on the service at the University Eye-Clinic, Tübingen, 1903.** *Inaug. Diss.*, Tübingen, 1904.

543. BOCK, EMIL. *Fourteenth Report of the Eye Department, Laiback Hospital*, 1904.

The suggestions of GONGE and DELOGÉ (533) for lessening the eye-affections prevalent in Algiers include improvements in housing, nourishment, and personal cleanliness of the lower classes, hygienic propaganda, accessible and as far as possible gratuitous treatment by trained oculists, and, furthermore, compulsory vaccination, as small-pox still destroys many eyes. Trachoma is the worst scourge, occurring at all altitudes and among all races.

Besides the commoner conjunctival affections, gonorrhœal ophtha lm in new-born and adults and syphilitic eye-affections are not rare. Leprosy and malaria are unusual factors. Toxic amblyopia is seen particularly among elderly native soldiers, as the Koran does not forbid absinthe. v. MITTELSTÄDT.

ZAWROW (534) saw 509 cases of hemeralopia in the Tsheremshansk circuit, Tzamara, in 1898–1899 and 1901–1903. Of these, 244 were Moldavians, 129 Tschuwaschians, 124 Russians, and only 12 Tartars. The greatest frequency among males was in those from ten to thirty years old; among the women, from twenty to forty years (period of child-bearing and nursing). The latter were only 20 % of the cases. The disease was most frequent during the great fasts in March and April, and during famine years. The Tartars are less susceptible, as even the poorest of them eat some meat. HIRSCHMANN.

BERRY'S (536) paper is not one that lends itself to abstract. In it the author attempts to reduce to a mathematical formula the effect of accidentally diminished visual acuity in rendering the patient more or less inefficient as a worker.

MARSHALL.

ELIASBERG (537) examined a number of Russian and foreign text-books and periodicals with Cohn's line-counter, and found only a small percentage of Russian publications meeting Cohn's requirement of at most two lines to the centimetre.

v. MITTELSTÄDT.

WIDMARK (538) finds that there is greater tendency to myopia in girls than in boys, that the acuity of vision and the percentage and degree of near-sight are more favorable in the school in Djursholm than in the government schools of the neighboring city. This is due to the fact that the country school-children spend more time out-of-doors and so counteract the deleterious short-range work. During the last few years school myopia in Sweden has been on the decrease. This is ascribed by Widmark to improved hygienic conditions in the schools, to increased laboratory and tool-work over book-work, and finally to the great impetus towards out-door sport. HELLGREN.

SCHREIB'S (539) report includes the entire school population of Tübingen, 2098 cases in all. Of these, 1368 emmetropic, 730 ametropic ; of a total of 4196 eyes, 368 were myopic ; among the academic students (colleges) the percentage of myopia was 27.7 per cent., as against 15.3 per cent. in the technology schools, 2.3 per cent. in the primaries, 6.5 per cent. in the girls' high-schools, and 4.5 per cent. in the common schools. Myopia shows a tendency to increase in each school-year with the demands of the advancing course of study. Bilateral or monocular hypermetropia was found in 282 cases, 12 per cent. ; astigmatism in 216, 10 per cent.

H. COHN (540) pleads energetically for the appointment of a corps of school oculists so that the anomalies of refraction in school-children may be found out and appropriately controlled.

LEONHARD (542) reports 1203 in-patients, 4095 out-patients, 327 operations on the lens, 115 on the iris, at the Tübingen University Eye-Clinic.

In 1904, BOCK (543) treated 1430 cases, performing 143 cataract operations, 80 iridectomies, and 10 enucleations.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND TREATMENT.

544. FRIBERGER, R. **Clinical studies of the pupil.** *Upsala Sakaret. forhandl.*, 1904, vol. ix.

544 A. KATZ, R. **Apparent diminution of vision in children.** *Russk. Wratsch*, 1904, No. 40.

545. WESSELY, K. **On absorption from the subconjunctival tissues;**

the relation between the irritating and the osmotic qualities of certain solutions. *Arch. f. experim. Pathol. u. Pharmakol.*, xlix., 1904.

546. LEWIN. **Chronic lead intoxication of the eye.** *Berlin klin. Wochenschr.*, 1904, No. 50.

547. TERTSCH. **A contribution to the study of the pseudo-diphtheria bacilli of the conjunctiva.** *Zeitschr. f. Augenheilk.*, xii., p. 621.

548. CHAILLONS. **Traumatic inoculation of the eyeball with an anaërobic micro-organism (bacillus perfringens).** *Société d'ophtalm. de Paris*, 1904, Oct. 11.

549. BULL, C. S. **Operations upon the eyeball in the presence of an infected conjunctival sac.** *Med. Record*, Sept. 24, 1904; also *Trans. Amer. Ophth. Soc.*, 1904.

550. DEMARIA, P. ENRIQUE. **Experimental study on the production of cataract by massage of the lens.** *Graefe's Arch. f. Ophth.*, lix., 3, p. 568.

551. GATTI, ALFREDO. **On the presence and importance of oxidation in the pathogenesis of naphthaline cataract.** *Ann. di Ottalm.*, 1904.

552. PUCCIONI, G. **Cytology of the aqueous in affections of the anterior segment of the globe.** *Boll. dell' Ospedal. Oftalm. di Roma*, 1904, No. 8.

553. TRUC. **Amputation of the anterior segment; histological examination of an old stump.** *Bull. et mém. de la soc. française d'ophtalm.*, 1904, p. 436.

554. GASPARINI, ELVIDIO. **Changes following extirpation of the superior cervical sympathetic ganglion.** *Ann. di Ottalm.*, 1904, parts 7–8.

555. KRAMSZTYK. **Sulphuric-acid burns of the eye.** *Arch. d'ophtalm.*, xxiv., 11, p. 730.

556. STIEREN, E. **Burns of the eye with carbolic-acid and ammonia.** *Ophth. Record*, Nov., 1904.

557. LE ROUX, H. **Ocular affections due to electricity.** *Arch. d'ophtalm.*, xxiv., 11, p. 729.

558. WOOD, C. A., and BULLER, F. **Poisoning by wood alcohol. Cases of death and blindness from Columbian spirits and other methylated preparations.** *Jour. Amer. Med. Assoc.*, Oct. 1, 8, 15, 22, 29, 1904.

559. GOLOWIN. **The significance of cyto-toxins in ocular pathology, especially in the pathogenesis of sympathetic ophthalmia.** *Russk. Wratsch*, 1904, No. 22.

560. SELENKOWSKY, F. W. **The toxine theory and other theories of sympathetic ophthalmia in the light of recent investigations.** *Westn. Ophthalm.*, 1904, No. 6.

561. TORNABENE, C. **Influence of iridectomy, miotics, mydriatics, and anæsthetics on the passage into the anterior chamber of substances injected hypodermically.** *Arch. di Ottalm.*, 1904, No. 2.

562. GRODDECK. **The relation of visual acuity to the circulation.** *Wiener med. Presse*, 1904, No. 4.

563. BECKER, FRANZ. **Studies on color-sense under artificial illumination.** *v. Graefe's Arch. f. Ophth.*, lix., 3, p. 427.

564. MARCHI, L. **Contribution to the study of nicotine intoxication**

with special regard to the changes in the visual organ. *Boll. dell' Osped. Oftalm. di Roma*, 1904, No. 9.

565. FRENKEL, H. **Alternating mydriasis and pupillary inequality.** *Arch. d'ophtalm.*, xxiv., 10, p. 655.

566. SHUTE, B. K. **Abnormal mobility of the iris as a diagnostic factor in diseases of the nervous system.** *Med. News*, 1904, July 30.

567. HOLTH, S. **A new procedure for the determination of the refraction.** *Norsk. Magaz. f. lægevidenskab.*, 1904, p. 1072.

568. ARCADIPANE, A. **The theory of skiaskopy.** *Arch. di Ottalm.*, 1904, part 12.

569. HEERFORDT, C. F. **Studies on catgut introduced into the anterior chamber; on sterilization of catgut by boiling.** *Hospitalstid*, 1904, p. 1121.

570. CLAIBORNE, J. H., and COBURN, E. B. **Experiments to determine the value of collargol and of anti-streptococci serum in infected wounds of the eye.** *Med. News*, Aug. 6, 1904.

571. WOODS, HIRAM. **Diaphoresis and diaphoretics in ophthalmic practice.** *Jour. Am. Med. Assoc.*, 1904, Dec. 24.

FRIBERGER (544) has made an extensive study of the habitual size of the pupil in pulmonary phthisis, neurasthenia, and hysteria, using the method previously described by him (*cf.* Abstract 749, 1903, p. 194) and his own instrument. To exclude the effect of age and ametropia, the cases were limited to those between fifteen and sixty years, hypermetropes of less than 3 D, and myopes of less than 6 D. Examination of 225 soldiers, eighteen to twenty-five years old, showed that the physiological diameter of the pupil is somewhat larger than that given by Tange and Silberkühl. Varying data are due to a lack of uniformity in illumination. The latter should always be given in terms of a definite standard. Friberger's investigations were made partly with an illumination of 100 meter-candles, partly with one of 15 *m-c.*

In the first stage of phthisis there is a definite but slight tendency to dilatation. Later on, examination with lowered illumination shows a slight decrease in diameter. In neurasthenia and hysteria the same conditions are found: dilatation in mild or transitory cases and those with symptoms of irritation, contraction in chronic cases. The pupillary reaction is, similarly, increased at first and diminished later on. Friberger attaches little diagnostic or prognostic significance to these pupillary symptoms as the changes in the average diameter of the pupil are exceedingly slight. In a given case the individual variation often makes it impossible to decide whether we have to do with

a pathological condition or not. Anisocoria is somewhat more frequent in phthisis than in health, but not more so than in general internal diseases. HELLGREN.

KATZ (544 A) observed several cases of alleged visual defect, some of which were due to auto-suggestion, and others to simulation. The former process often develops in children on the basis of a run-down nervous system after severe illness, in over-exhaustion and excitement. Girls are more susceptible than boys. The treatment must be directed toward the underlying affection. Suggestion is often efficacious. HIRSCHMANN.

WESSELY'S (545) investigations show that when soluble substances are injected beneath the conjunctiva, only infinitesimal amounts penetrate the globe, so that the concentration of the solutions is practically unaltered, and any changes are purely due to local processes in the connective tissue, influenced but not determined by diffusion and osmosis.

LEWIN (546) attributes to lead poisoning the occasional development of various forms of eye-disease, ranging from transitory blindness to severe optic neuritis with consecutive atrophy, retinitis, hemianopsia, oculomotor paralyses and spasms, and corneal infiltrations. Of 114 cases due to lead poisoning, 40 were cured, 22 improved, 36 went on to optic-nerve atrophy, and 16 died. The course was chronic in 84, and acute in 45, of 127 cases.

TERTSCH (547) examined 32 strains of pseudo-diphtheria bacilli, of which 23 were taken from the normal conjunctiva, 5 from a catarrhal conjunctivitis, and 4 from a case of xerosis; 6 strains were found which gave a marked agglutination reaction with an agglutinating diphtheria serum of high potency, and are accordingly to be considered as true diphtheria germs.

Among the non-virulent pseudo-diphtheria bacilli of the conjunctival sac three groups are to be distinguished. The first includes all strains giving a marked agglutination reaction with a high-potency serum; these are true Klebs-Loeffler bacilli, but non-pathogenic, growing somewhat less vigorously, and producing less acid than the virulent germs, and giving a partially positive reaction to Neisser's double stain. There are transitions from this group to a second, consisting of poorly growing strains of low stamina, with the characteristics, in cultures, of true diphtheria bacilli. The third group consists of luxuriantly growing strains, producing alkali in large quantities, which are

quite different from genuine Klebs-Löffler bacilli. Whether these non-virulent forms may become pathogenic, so that diphtheria could develop without infection, still remains undecided.

BULL (549) advises a thorough microscopic and bacteriologic examination of the contents of the conjunctival sac before operation in every case where there is suspicion of infection. If toxic germs are found in great numbers, no operation should be undertaken until the sac is reasonably sterile. Operations are counterindicated unless diseases of the lachrymal apparatus are previously treated. ALLING.

DEMARIA (550) produced cataract in rabbits by massage of the lens. The first change observed was a mechanical loosening, tearing, and folding of the anterior capsular epithelium. Degenerative changes in the epithelial cells which then followed were of a secondary nature and due not only to injury but to imbibition of aqueous fluid.

GATTI (551) finds that in rabbits poisoned with naphthalin the vitreous and lens often take on an amber or rust-red hue, which increases on exposure to air, and disappears when the tissues are placed in a vacuum. This suggests the presence of an oxydizing agent.

PUCCIONI'S (552) examinations of the aqueous show that in the specific forms (syphilitic iritis, hereditary parenchymatous, neuroparalytic, scrofulous keratitis) there is invariably lymphocytosis, while in acute infectious forms, such as corneal ulcer, polynuclear leucocytosis is the rule. CIRINCIONE.

TRUC (553) examined a globe whose anterior segment had been amputated to append a better stump for an artificial eye. There was no trace of inflammatory changes either in the scar or in the various tissues. The retina showed marked proliferation of neuroglia, with simultaneous disappearance of the nerve elements. These changes became less marked toward the posterior pole. On the strength of this anatomical finding, Truc recommends amputation of the anterior segment as free from danger and advantageous from the cosmetic point of view.
BERGER.

GASPARINI'S (554) experiments on dogs and apes demonstrated marked changes (sclerosis) in the sympathetic after extirpation of the ganglion on the other side, showing that, in these animals at least, there is a close connection of the sympathetic fibres of the two sides. CIRINCIONE.

KRAMSZTYK (555) finds that the clinical picture of sulphuric-acid burn of the eye does not correspond to that drawn by Villard (*Arch. d'opht.*, p. 363) on the basis of animal experiment. The marked corneal opacity described by the latter is not observed. On the contrary, the cornea in Kramsztyk's cases remained perfectly transparent, although later ulceration with perforation took place on account of the extensive and deep destruction of the conjunctiva. v. MITTELSTÄDT.

Three cases of burn with carbolic acid and four with ammonia are recorded by STIEREN (556). He summarizes the results of his observations in the statement that either of these caustic agents in sufficient quantity to cause marked escharotic action warrants an unfavorable prognosis, especially if the cornea is hazy. This is particularly true of ammonia, which seems to impair the lymph circulation in the cornea and results in dense opacities. ALLING.

LE ROUX (557) reports the case of a workman whose eyes were exposed for four minutes to an arc-light without causing dazzling or erythropsia. Six hours later the usual manifestations of pain and irritation set in, with marked ciliary tenderness. In spite of the marked reaction, vision returned to normal within twenty-four hours, while photophobia and redness of the lids were still present. v. MITTELSTÄDT.

WOOD and BULLER (558) present in an extensive article the results of their studies of wood-alcohol poisoning. Short clinical histories of 89 unpublished cases are given. Altogether there are 153 cases of blindness and 122 of death, making 275 in all, now reported. A tabulated report of published cases is appended. ALLING.

GOLOWIN (559) suggests the following explanations of sympathetic inflammation on the basis of cytotoxins; after ocular injuries, particularly those of the ciliary region, certain conditions, with or without the participation of bacteria, cause a destruction of the cells of the ciliary body with the formation of special decomposition products, cytotoxines. The latter enter the general circulation, where they are usually neutralized by antitoxines. If the immunizing function is weakened, the toxines may be carried in an active condition to the sound eye and exert their specific injurious effect on its ciliary body. Bacteria which happen to be in the blood may take part in the morbid process which now develops, but their rôle is a minor one. To prove the

possibility of the formation of cell poisons having a specific effect on the ciliary body, Golowin injected an emulsion of dog's iris and ciliary body into the peritoneum of rabbits. After repeated injections, blood serum from these rabbits was injected into the anterior chamber or vitreous, and into the blood-vessels of dogs. In the former case, the symptoms of serous iritis invariably developed; in the latter, only microscopic evidence was found, principally in the ciliary processes. Golowin suggests that there are two poisons, a cyclotoxin, acting on the unpigmented epithelium, and a pigmentolysin, which dissolves the pigment cells of the ciliary body. HELLGREN.

SELENKOWSKY (560) reviews all the recent publications on sympathetic ophthalmia, and draws the following conclusions: Modern investigations, including those of Selenkowsky (1898 and 1899), prove the untenability of the theories of Graefe-Müller, of Schmidt-Rimpler, and of Deutschmann, the migratory theory. Berlin's theory revised by Römer cannot be accepted. Golowin's cytotoxin theory fails to explain important aspects of sympathetic ophthalmia and is contradicted by numerous data of pathological anatomy. Selenkowsky's Beseterio-toxin theory has not been disproved, experimentally or in theory, by recent investigations. HELLGREN.

TORNABENE (561) finds by experimental investigation that the entrance into the anterior chamber of substances, such as potassium iodide or fluorescine injected subcutaneously, is hastened by cocaine, eserine, and pilocarpine, but retarded by atropine. CIRINCIONE.

GRODDECK (562) considers plethora and meteorism a frequent cause of diminished vision. Apparently irreparable visual disorders may disappear after suitable diet has been instituted and the circulation regulated.

BECKER (563) finds that there is no artificial light which is at all like daylight in chromatic qualities. They are all characterized by a marked diminution of color contrast for yellow. Warm lights, such as gas, petroleum, incandescent electric-light, decrease, while cold lights, as Welsbach and acetylene, increase, the contrast for red. The contrast for green is not increased by warm lights as much as might be expected, the most marked effect being produced by the cold acetylene. Contrast for blue is somewhat heightened by petroleum, acetylene, and incandescent light; approximately normal with the Welsbach.

MARCHI's (564) experiments on dogs show that chronic nicotine poisoning is more evident in animals which have been treated by the gastric route, and only in this way can the picture of tobacco-amblyopia be produced. Ophthalmoscopic examination showed only contraction of the retinal vessels and pallor of the temporal half of the disc. In the microscopic sections no evidence of neuritis was found. CIRINCIONE.

FRENKEL (565) discusses alternating mydriasis, which may invariably be seen when the pupillary reaction to light, convergence, or orbicularis contraction is unequal in the two eyes, or when one pupil is illuminated more intensely than the other. Spontaneous mydriasis of this sort is always caused by irritation of the sympathetic, and occurs in progressive paralysis, tabes, and cervical myelitis, in extra-medullary affections which affect the sympathetic (cancer), and in systemic diseases (pneumonia, pleurisy) which act by reflex. Its occurrence in hysteria and neurasthenia has not been demonstrated beyond a doubt. The prognosis depends largely on the nature of the underlying cause, that of the experimental form, more particularly on the nature of the pupillary reactions and the reasons for disturbed motility.

V. MITTELSTÄDT.

HOLTH's (567) skiakineskopy is a subjective method of determining refraction depending on the perception by the patient of a shadow when an object narrower than the pupil is moved directly in front of the latter and a luminous point is fixed. Myopes see the shadow moving with, hypermetropes, against, the object. Emmetropes see no shadow. In astigmatism the direction of the shadow is parallel to the object only when the latter is in one of the principal meridians. Slight degrees of ametropia can be detected and accurately estimated by this method, which Holth claims is rapid and delicate. HELLGREN.

ARCADIPANE (568) claims that skiascopy is a method of determining the static refraction in the inverted image. The position of the far point is determined by having a real picture of the fundus fall upon the observer's pupil. The underlying theory is the following: When a plane drawn through the far point of the subject coincides with the pupillary plane of the observer, motions of the mirror produce no shifting of that portion of the light rays issuing from the eye which coincides with the pupillary area of the observed.

CIRINCIONE.

HEERFORDT (569) explains the structure and composition of catgut. Numerous experiments were made to determine the absorbent qualities of this material and its strength, when dry, soaked, boiled in water, or boiled in saturated salt-solution. The method of sterilization suggested by Elsberg (*Centralbl. f. Chir.*, 1900, No. 21) cannot be used in all cases, as dry threads are not permeated by the boiling solution and wet threads become brittle. The following modification makes the above method feasible, but narrows its practical application. Loosely wound catgut, free from fat, is allowed to lie in solutions of ammonium sulphate of increasing strength, and finally boiled for five or ten minutes in a saturated solution of the same chemical, without any loss of strength. The method is insecure for sizes above No. 2 Raw catgut probably contains no pathogenic bacteria which are capable of development. HELLGREN.

The experiments of CLAIBORNE and COBURN (570) did not demonstrate any favorable action of collargol or antistreptococcic serum on purulent processes in rabbits' eyes. ALLING.

WOODS (571) gives a general synopsis of diaphoresis, and concludes that it is of most value in acute congestive and exudative lesions of the uveal tract. In tobacco-alcohol amblyopia and in other forms of toxic amaurosis diaphoretics are useful, but of no account when atrophic or cicatricial changes are present.

ALLING.

III.—INSTRUMENTS AND REMEDIES.

572. FOX, L. WEBSTER. **Injections of sugar-salt solutions in ophthalmology.** *Ophthalmology*, Oct., 1904.

573. HOLTH, S. **The technique of polychrome tattooing.** *La clinica oculistica*, Sept., 1904.

574. LIPPINCOTT, J. A. **A modification of the anterior chamber irrigator.** *Am. Jour. Ophthalm.*, June, 1904.

575. JOSEPH, HENRY. **Hook-neurotome for section of the optic nerve at the apex of the orbit.** *Arch. d'ophtalm.*, xxiv., 11, p. 714.

576. REYMOND, C. **Simple apparatus for determining the relation of illumination to visual acuity.** *Giorn. della R. Acad. di Med. di Torino*, 1904, No. 9.

576 A. LIFSCHITZ, S. J. **Ein modificirtes tonometer.** *Westn. Ophthalm.*, 1904, No. 6.

577. GURWITSCH, B. **Clinical application of the Fick-Lifschitz tonometer.** *Westn. Ophthalm.*, 1904, No. 6.

FOX (572) considers subconjunctival injections of 1–3 per cent. solutions of sodium saccharinate of great value in keratitis

particularly the interstitial form. In the treatment of corneal infiltrates and vitreous opacities this procedure has given very satisfactory results. ALLING.

HOLTH'S (573) experiments in tatooing show the following substances to be best for the corresponding colors: for black, lamp-black; for red, cinnabar; for brown, a mixture of cinnabar, sienna, and sepia; for yellow, raw sienna; for blue, sepia, green, ultramarine; for gray, powdered graphite; for white, Chinese white. The pigments should be sterilized by heating to 150° C. in hot air. CIRINCIONE.

JOSEPH'S (575) neurotome is devised to cut through the nerve as far back as possible, as is desirable in intraocular tumors and in sympathetic ophthalmia. It consists of a flat narrow metal sheath, enclosing a guillotine, and provided at the lower end with a small round niche which can be closed by pushing forward a slender bar. The sheath has a ring on either side through which fore- and middle-fingers are passed, the thumb entering a third ring at the end of the steel plate and pressing the latter down. The instrument is passed between the detached internal rectus and the globe, and the nerve caught in the niche, which is then closed. The nerve is now put on the stretch and the neurotome holding it as in a ring is allowed to glide down to the apex of the orbit. The guillotine is now pressed home and the nerve severed 15–23*mm* back of the globe. V. MITTELSTÄDT.

REYMOND'S (576) apparatus consists of a combination of two similar, achromatic Wollaston prisms.

LIFSCHITZ (576 A) finds that in using the Fick tonometer it is difficult to say just when the foot-plate is in perfect contact with the globe without impressing it, and whether the foot-plate lies even or skewed. In the latter case the spring is bent and an incorrect reading given. Lifschitz has replaced the round plate with a rectangular prism, the hypothenuse surface of which is 7*mm* square. The latter is placed on the cocainized cornea. The contact surface appears as a dark disk, and the tonometer is pressed against the eye until the contact-surface touches the edges of the prism as an inscribed circle. The index, doubled, registers intraocular pressure in millimetres of mercury.

HIRSCHMANN.

GURWITSCH'S (577) comparisons of the tonometer of Fick-Lifschitz and that of Maklakow in 69 cases (136 eyes) show very slightly varying figures for intraocular tension. The former

instrument is more easily and rapidly applied than that of Maklakow, giving the intraocular pressure in millimetres in a few seconds, with the patient seated, and without interfering even temporarily with vision, by the use of coloring matter.

HIRSCHMANN.

Sections IV.–VII. Reviewed by DR. G. ABELSDORFF, Berlin.

IV.—ANATOMY.

578. MÜNCH, H. **The muscular character of the stroma cells of the uvea.** *Zeitschr. f. Augenheilk.*, xii., 4, p. 525.

579. GREEFF. **The etiology of anophthalmus and other malformations of the eye.** *Arch. f. Augenheilk.*, li., 1, p. 1.

580. ABELSDORFF, G. **On the occurrence of blue eyes and heterochromia in deaf albinotic animals.** *v. Graefe's Arch. f. Ophthalm.*, lix., 2, p. 376.

581. TILLAUX. **The lachrymal sac.** *Recueil d'opht.*, xxvi., p. 643.

MÜNCH (578) found nuclein-spirals as an invariable form element in the nucleus of unstriped muscle cells, and a similar formation in the protoplasm of the uveal cells; the arrangement of the pigment may present the picture of cross-ribbing. Fibrillary, longitudinal striation, reticulation on cross-section, and chemical reaction of the cells, as well as the contractility of the choroid, speak in favor of its having a muscular structure. Münch concludes that the cell net of the uveal stroma is a muscle tissue; as this network is densest in the neighborhood of blood-vessels, it probably serves mainly vasomotor purposes; this appears all the more certain in regard to the iris, as the vessel walls have no muscularis of their own.

GREEFF (579) found the following anomaly in a little girl, aged one and a half years, with negative family history: right anophthalmus, with two deep skin furrows running obliquely upward and downward from the outer canthus. Slight makrostoma on the right side. Rudimentary hare-lip and cleft palate, with a large bone defect at the upper edge of the right zygoma. Coloboma of the left upper and lower lids. Greeff explains all these malformations by the agency of amniotic bands and adhesions during intra-uterine life.

ABELSDORFF (580) found that blue-eyed white dogs and cats, which are usually deaf (Buffon), have albinism of the mesodermal layer of the uveal tract, while the investing epithelium shows normal pigmentation. This albinism may affect the iris

alone, or involve the entire uvea. In the latter case there is leukosis of the choroid invariably associated with an ophthalmoscopically and anatomically demonstrable absence of the tapetum lucidum.

V.—PHYSIOLOGY.

582. EXNER, S. **A contribution to our knowledge of central vision.** *Zeitschr. f. Psych. u. Phys. d. Sinnesorg.*, xxxvi., 3, p. 194.

583. STRAUB, M. **On monocular stereoscopic vision, with description of a stroboscope used as a monocular stereoscope.** *Ibid.*, xxxvi., p. 431.

584. BUMKE. **Studies on the galvanic light-reflex.** *Ibid.*, 4, p. 294.

585. SIMON, RICHARD. **On fixation in twilight vision.** *Ibid.*, xxxvi., p. 186.

586. TRENDELENBURG, WILH. **Quantitative studies on bleaching of the visual purple in monochromatic light.** *Ibid.*, xxxvii., p. 1.

587. GSTETTNER, M. **On color changes in the living iris of man and vertebrates.** *Pflüger's Arch. f. d. ges. Phys.*, cv., p. 335.

588. TRENDELENBURG, W. **On the occurrence of visual purple in the eye of the bat, with remarks on the relation between visual purple and retinal rods.** *Arch. f. Anat. u. Phys., Phys. Abth. Suppl.*, p. 228, 1904.

589. BARTELS, M. **Pupillary conditions in the new-born.** *Zeitschr. f. Augenheilk.*, xii., 6, p. 638.

590. BACH, L. **The pupil in convergence and accommodation.** *Ibid.*, p. 725.

591. WOLFF, H. **On the diminution of the pupillary reflex sensibility of the retina from the centre toward the periphery.** *Ibid.*, 5, p. 644.

592. WEINHOLD. **On conceptions of distance as affected by binocular fusion of partial images.** *v. Graefe's Arch. f. Ophth.*, lix., 3, p. 459.

593. LEVINSOHN, G. **Contributions to the physiology of the pupillary reflex.** *Ibid.*, lix., 2, p. 191.

594. LEVINSOHN, G. **On lid reflexes.** *Ibid.*, p. 381.

595. BACH, L., and MEYER, H. **On the pupillary conditions after removal of the cerebral hemispheres, cerebellum, on irritation of the lateral portion of the medulla and of the trigeminal nerve, on the basis of experimental investigations on cats and rabbits.** *Ibid.*, 2, p. 332.

596. BECKER, F. **Studies in the color sense under artificial light.** *Ibid.*, 3, p. 424.

597. SCHREIBER, L. **On vital staining of the cornea with indigo-carmine, and remarks on the behavior of indigo-carmine in the blood and in the eye.** *Ibid.*, lviii., 2, p. 343.

598. BJERRUM, J. **A case of congenital color-blindness, with remarks on the function of the rods and cones.** *Hospitalstid*, 1904, v. 1145.

599. PATTERSON, J. V. **Some observations on the lymph flow through the eyeball in man and certain animals.** *Jour. Path. and Bacteriol.*, March, 1904.

600. FRANK, M. **Comparative study of normal and of subnormal**

color sensation in their relation to distant signals. *Ophth. Record*, Aug., 1904.

601. POLACK, O. **Manifestations of ocular chromatism and color perception.** *Ann. d'ocul.*, lxxxii., p. 424.

602. GRYNS, G., and NOYONS, A. H. **The absolute sensibility of the human eye for light.** *Ned. Tydschr. vor Geneesk.*, 1904, ii., p. 24.

603. WERTHEIM, SALOMONSOHN, and SCHOUTE. **Psychologic-optical studies on the relation of the law of stimulation to Weber-Fechner's law.** *Ibid.*, 1905, ii., No. 23.

604. SCHANZ. **On learning to read by those born blind and later restored to sight.** *Zeitschr. f. Augenheilk.*, xii., 753.

EXNER (582) presented the experiments of Hitzig, which demonstrate the participation of the cerebral cortex, not alone that of the occipital lobe, with the visual act, and reported upon the experiments of Imamura in Exner's laboratory on division of the corpus callosum.

STRAUB (583) uses a stroboscope for the demonstration of monocular stereoscopy. To the eye of the observer looking through the slit of the turning cylinder, stereoscopic figures on cardboard are presented, which are arranged at equal distances, and have each a part of the lines in common. This represents the stationary part of the object represented; the moving part is composed of the lines of the following picture, which have been slightly displaced. As these pictures are seen, one after the other, with monocular vision, a perfect stereoscopic effect is produced. A certain number of the lines remain unchanged, and hence seem to lie in one plane. The parallactic displacement of other lines is interpreted as a difference of level. Monocular stereoscopy depends on double images, which, however, are produced successively on one retina by parallactic displacement and then appear as a single point nearer or farther off. In binocular stereoscopy we have simultaneous double images, and the parallax is interpreted, psychically, as a difference in level.

BUMKE (584) has shown that galvanic light-stimulus also produces reflex pupillary contraction, and tries to apply this to the differentiation of direct and consensual light-reaction by determining the required minimum of stimulation for the pupillary reflex. The results were not unequivocal, as in many cases no difference could be noted between the direct and the consensual reaction, while in some the former was more prompt. In conditions of exhaustion (sleepless nights) the galvanic-light sensibility is increased, that of the pupil diminished.

SIMON (585) studied the position of the eyes in twilight vision, starting with the well-known fact that very faintly luminous points are seen with paracentral, not with macular, fixation. He determined the boundary of the blind spot with illumination which was subliminal for the fovea and compared this with the extent of the blind spot after adaptation to light. It appears that, in monocular sighting of points too faintly luminous to be seen with the fovea, the right eye fixes with a point of the retina just above and outward from the macula; the left eye with a point directly above it. The degree of deviation decreases with the growing clearness of the object and with progressive adaptation. Although no nystagmus was present, the objects appeared unsteady, probably on account of involuntary eye-motions due to the rather difficult eccentric fixation.

TRENDELENBURG (586) has made exact determinations of the bleaching of visual purple by spectral light rays. Solutions of purple from rabbits' eyes were exposed to a Nernst lamp (dispersion spectrum) for a certain time, and the amount remaining undecomposed was then determined by photometric determination of the absorption spectrum. It was found that the bleaching action of spectral rays on visual purple is directly proportional to their action upon the eye under what is known as twilight vision. This confirms König's view of the identity of the absorption-coefficient of the visual purple with the distribution of luminosity in the colorless spectrum with faint light.

Trendelenburg was unable to find, in partially decomposed purple, any trace of an intermediate product of bleaching, such as Kühne's visual yellow, and concludes, with Köttgen and Hellgren, that the process consists in a gradual loss of concentration of the substance without the formation of any decomposition substances

GSTETTNER (587), investigating at Exner's suggestion, finds that the iris becomes lighter in color when the pupil contracts, and that the color changes by admixture of a yellowish tone; brown eyes become lighter, dark blue eyes become gray-blue.

These changes are explained by a clouding of the iris tissue due to a double refraction of light by the fibres of the iris which are stretched by the contraction of the sphincter.

TRENDELENBURG (588) has found visual purple in the retina of the hedgehog, duck, and bat (Vesperugo noctula and Vesperugo pipistrellus), animal forms which have not been thoroughly

studied. In all these species there are retinal rods, a further proof of the regular connection of these cells with the presence of visual purple.

BARTELS (589) found 2.5 and 3.25*mm* as the average diameter of the pupil in infants, after adaptation to bright light (Welsbach); during sleep there is marked meiosis (1.5*mm*). There was no difference in the two sexes. With the faintest illumination they never exceeded 5*mm* in diameter, the average being 4*mm*; but atropine produced a prompt dilatation to 5.5*mm*.

BACH'S (590) observations show that the amplitude of the convergence reaction of the pupil ranges from $\frac{1}{4}$ to $\frac{3}{4}$*mm*. It is comparatively marked in the Argyll-Robertson pupil, and may persist with almost complete accommodative paralysis.

WOLFF (591) shows circumstantially that he was the first to prove that the pupillary reflex irritability of the retina diminishes from the centre toward the periphery, and contradicts the view of Abelsdorff and Feilchenfeld that this was a well-known fact.

WEINHOLD (592) demonstrates that the conceptions of distance induced by binocular fusion of half-images are geometrically determined by the position of the intersection of the visual lines and set up by sensations of convergence, although they may be modified by ideas as to the actual or apparent size of the objects seen.

LEVINSOHN'S (593) experiments on rabbits corroborate those of Bach and Meyer on cats in showing that an incision at the end of the floor of the fourth ventricle, or one from the middle downwards, will produce extreme meiosis, the incidence of which requires only the exposure of the medulla. The same result followed section of the medulla at higher points. As a sequela, a slight contraction of the pupil persisted. Levinsohn explains this meiosis by irritation of the descending root of the trigeminus, with a possibility of the sympathetic nucleus having been injured, and does not suppose, as Bach does, a special pupillary centre. Section experiments lead Levinsohn to conclude that the lower limit of the pupil-reflex arc is about on a level with the spinal end of the oculomotor nucleus—that is, directly behind the posterior corpora quadrigemina and the posterior surface of the motor-oculi nerve.

Levinsohn's experiments to determine the cerebral centre for the sphincter pupillæ confirm in general Bernheim's statement that it is situated in the small-celled median nucleus of

Edinger-Westphal. Levinsohn extirpated the ciliary ganglion as the central neuron of the sphincter fibres, and found, in the median nucleus of the operated side, degenerative changes in the ganglion cells. Stimulation of the front and middle portion of the anterior corpora quadrigemina below the aqueduct of Sylvius, by means of weak electric currents, caused pupillary contraction in dogs. Extirpation experiments were not fully decisive as sharply isolated destruction was not attained.

In rabbits, removal of the anterior quadrigemina and of the upper layers of the tegmentum to below the aqueduct of Sylvius had no influence on the pupils or on the winking reflex. A destruction still farther toward the centre caused, in the anterior half, loss of pupillary and winking reflex on the opposite side; in the distal half, a similar result on the corresponding side only. If the centrifugal reflex path in rabbits also arises in the small-celled median nucleus, a second crossing of the centripetal pupillary fibres must take place besides that in the chiasm. This is probably situated below the aqueductus Sylvii, at about the middle of the anterior corpora quadrigemina.

Levinsohn (594) studied the cortical centre for the lid-reflex in rabbits and doves. Extirpation of an entire hemisphere lowered the reflex on the opposite side. In dogs and apes, where a more exact localization is possible, the reflex centre lies in Munk's optic-sensory sphere of the opposite side. The lowering of the reflex, as indicated by loss of reaction to a gentle touch, is temporary. The subcortical centre mediates lid-closure in response to strong stimuli, and lies, in rabbits, in the posterior layers of the pons or in the anterior portions of the medulla on the corresponding side. The blinking reflex to stimulation by light is also of subcortical origin in rabbits and doves; in the former, the centripetal fibres pass through the external geniculate body to the region of the facial nucleus.

Bach and Meyer (595) continuing their experiments on the intracerebral path of the pupillary reflex, find that, in cats, removal of the hemispheres does not affect the reaction to light. The reaction to pain is also unaltered by removal of one hemisphere, but disappears when both are destroyed. After removal of the cerebellum a prompt reaction to light could still be elicited. Stimulation of the trigeminus near its point of exit caused no pupillary contraction; stimulation of the Gasserian ganglion was followed by bilateral dilatation.

In rabbits, the results were different. Mechanical irritation of the region of exit of the trigeminus and of the nerve itself below the ganglion caused contraction of the corresponding pupil. This was not affected by section of the medulla in the neighborhood of the posterior corpora quadrigemina, but the contraction rapidly lessened, although it did not entirely disappear, on irritation of the superior cervical sympathetic ganglion. The authors find in these data a confirmation of their hypothesis of an inhibitory centre in the medulla for the pupillary reflex in cats. In rabbits, irritation of the cervical portion of the cord and of the lateral part of the medulla is without influence on the pupil, or causes slight contraction on the stimulated side. This variation does not appear remarkable considering the naturally sluggish light reaction of the pupil in rabbits, and the marked differences between the intracerebral visual paths of this animal and those of the cat.

Becker (596) determined the limits for recognition of black, red, yellow, green, and blue letters by gas, petroleum, acetylene, Welsbach, and incandescent light. In accord with the marked reduction of the color-contrast for yellow caused by these lights, the yellow letters were recognized with most difficulty.

Gas, petroleum, and electric light lower the red-contrast, which is increased by the Welsbach and acetylene. The last gives the most marked green-contrast. The blue-contrast was heightened by petroleum, acetylene, and incandescent light.

Schreiber (597) studied the hypothetical system of corneal lymph-canaliculi by variously modified injections of indigo-carmine in frogs and rabbits. The invariable result was a more or less intense, diffuse staining of the entire cornea without differentiation of cell and stroma substance. The structures which other authors describe as lymph-tubules proved to be the nuclei of the corneal corpuscles. The latter become differentiated by the ground-substance losing its stain if the sections are subjected to evaporation by the entrance of air under the cover-glass or by reason of having been hardened in alcohol. After-staining with Bismarck-brown proved the identity of these elements with the nuclei. Staining with indigo-carmine takes place by its rapid reduction and its transition into a leuko-product. This reduction is caused by the death of the cell protoplasm. Oxidation by the air then metamorphoses the leuko-product into indigo-carmine, which is taken up by the easily stained nucleus. In the blood,

indigo-carmine circulates in a state of solution, unreduced. In rabbits' eyes, after subcutaneous injections, the regenerated aqueous is blue; cornea, lens, vitreous, choroid, and retina are colorless; the sclera is deeply stained. Schreiber concludes that there is no proof of the existence of a system of corneal lymph-canals, and that Leber's theory of the nutrition of the cornea by diffusion is correct.

BJERRUM (598) reports a case of total congenital color-blindness with typical symptoms, and discusses the function of the rods and cones. There is much truth in the general view that in these cases the rods alone are adapted and in function, but there is probably no great diversity in function between rods and cones, and a specialization as apparatus for dark and light, respectively, is doubtful. HELLGREN.

In spite of much contradictory evidence on this subject it is now usually held that: 1. The main seat of secretion of the intraocular fluids is the ciliary body, and the path to the anterior chamber is through the pupil. 2. In man the fluids are eliminated through the angle of the anterior chamber by way of the canal of Schlemm. There is in man a very little flow by way of the nerve, though this is a most important path in the rabbit. 3. The anterior chamber is in more or less free communication with the canal of Schlemm and with the veins. 4. It is probable that the iris plays some part in the absorption of fluids.

The first series of experiments PATTERSON (599) undertook were for the purpose of observing the flow in rabbits. For this purpose he used albino animals and injected a varying amount of Chinese ink into the vitreous. This caused no reaction during the time the animals remained alive, which was from three to twenty-four hours. The ink did not diffuse itself through the vitreous but flowed backwards towards the papilla, while some of it spread round the posterior surface of the lens, and would probably sooner or later have appeared in the anterior chamber; the time limit (twenty-four hours) was insufficient to demonstrate this. These experiments showed that the chief way in which fluid can get out of the eye in the rabbit is by way of the posterior channels.

The same experiment in dogs was less uniform than in rabbits, and this was due to the greater reaction the operation set up. The tendency for the ink to pass backwards was not seen at all in this animal. It spreads itself more diffusely through the

vitreous, and in every case passed forwards to a greater or less extent; it passed round the lens, through the hyaloid and zonule, and finally through the pupil into the anterior chamber. It then tended to accumulate in the spaces of Fontana.

In the cat there was less tendency to reaction and the fluid passed in an almost identical manner with that in the dog.

In the monkey, the eye so closely resembles that of man that the experiments were of great interest. Unfortunately, however, these eyes greatly resented the presence of foreign matter in the vitreous and much reaction was set up, thus interfering much with the passage of fluid. The tendency of the ink to pass forwards was quite marked, but only traces of it appeared in the anterior chamber within twenty-four hours. There was, however, a tendency for it to spread backwards towards the disk, though none was actually seen in the perivascular space round the central vessels of the optic nerve.

When ink was injected into the vitreous of a freshly enucleated rabbit's eye, it passed freely forwards into the anterior chamber and escaped into the veins. There was free passage down the central canal of the nerve, but not into the nerve sheath. In the dog it passed forwards, but none penetrated the optic nerve. In the monkey it appeared in the anterior chamber after sixteen hours, but only in small quantities; the iris was not stained as in the dog, or at any rate to a much less extent. In sheep and pigs it readily passed from the vitreous into the anterior chamber.

When ink was injected into the anterior chamber of a healthy human eye directly after excision, it passed with great rapidity into the veins and an exquisite injection of the circumcorneal vessels was obtained. In this eye and in another the ink readily passed into the iris, and only the area occupied by the sphincter was free from color.

In excised monkeys' eyes much the same condition was found. In the dog the results were not so uniform. In the sheep, pig, and rabbit, the ink did not pass into the iris from the anterior chamber, but easily passed into the veins.

He next describes the apparatus he used to determine the rate of flow through the anterior chamber. He found that the average rate of flow in the rabbit was *3ccm* per minute. In the dog the rate of flow varied widely from *26ccm* per minute to *6ccm*. In the cat the rate varied from 13 to *8ccm*. In the monkey the

flow was about *7ccm* per minute. In the sheep it was on an average about *26ccm* per minute, and in the pig about *10ccm.*

The post-mortem experiments do not, however, give much idea of what the rate of flow is from the anterior chamber during life. If a canula is introduced into the anterior chamber during life and is put into communication with a column of fluid equivalent to the intraocular pressure, little or no fluid will be found to pass into the eye, but after death the ciliary secretion will be suspended and fluid will flow into the eye and leave by the ordinary channels. The author then goes somewhat into the question of glaucoma.

In cases of iridocyclitis, the cause of the increased tension, which is often present, has been much discussed. He considers that it is due, not so much to the presence of an albuminous ciliary secretion, as to the blocking of the fine channels of escape at the filtration angle by inflammatory products.

As there is never any difficulty in the passage of fluid at the edge of the lens, he does not believe in Priestley Smith's theory that an increase in the size of the lens has anything to do with the production of glaucoma. The general and local vascular degeneration that so frequently is present in glaucoma patients has not been fully interpreted, nor its full significance recognized. Some permanent difficulty to the passage of fluid into the veins must exist, but whether that difficulty is due to an obstruction between the anterior chamber and the veins, or merely to an increased blood pressure in the veins which prevents the flow of lymph into them and thereby maintains an abnormally high intraocular tension, has not been definitely settled.

FRANK (600) calls attention to the marked individual variations in the perception of distant colored lights, and lays stress on the practical importance of testing the vision of railway men under service conditions. He recommends the use of Nels's signal glass, on account of the purity of its color and high degree of transparency. ALLING.

POLACK (601) is of the opinion that color perception is affected by chromatic aberration of the eye to a greater degree than is generally supposed. If a brilliantly illuminated sheet of white paper on a black background is fixed for a time while half of the pupil is covered with a dark screen, the edge of the latter appears fringed with colors. A similar experiment was used by

Sylvanus Thompson to show the existence of chromatic aberration. This appears not only in the shape of colored circles or stripes, seen around objects in certain experiments, but also in a modification of the colors seen. This is shown by the following observation : As violet rays come to a focus in the eye in front of red rays, hypermetropes see a violet centre with a red ring, myopes a red centre with peripheral violet. The refraction has a marked influence on color perception. A small blue disk on a red ground appears to myopes dark, with a slight green tone, to hypermetropes it appears light with a violet tone. Slightly myopic painters show a tendency to accentuate red and orange ; colored shadows (red, orange) are painted very brilliantly. Polack thinks it well to leave their myopia uncorrected when of low degree. BERGER.

GRYNS and NOYONS (602) investigated the smallest amount of light which is capable of producing any sensation. In one series of experiments a rotating mirror was used as a measure of small-time intervals ; in a second series a small opening in a pendulum swinging in front of a slit, gave a measurable period of illumination. In connection with their investigations they conclude that there can be no minimum for light perception, as the minimum is a function of the period of illumination, at least when the time of exposure is very short. These results cannot be explained by Fechner's law, which does not consider the time element. JITTA.

WERTHEIM, SALOMONSOHN, and SCHOUTE (603) have made careful calculations and extensive experiments which show that, at least for the organ of vision, Weber-Fechner's law requires a number of corrections. Their conclusions alone can be presented here. The following facts must be considered : (1) Irradiation ; (2) the formation of after-images ; (3) the extent of the stimulation ; (4) the duration of stimulation, depending on (*a*) time, (*b*) the condition of adaptation of the organ. As a condition for the applicability of the above-mentioned law, they require that the stimulus must affect a sufficient number of peripheral (perspective) organs and last sufficiently long.

JITTA.

SCHANZ (604) reports in full the case of a boy, aged six years, with congenital cataract. The chalky masses were cut through with Wecker's scissors. It was particularly striking that the boy, in learning to see, did not recognize his own image or that

of others in a looking-glass, and could not distinguish the simplest pictures of objects, but tried, in vain, to feel them.

VI.—REFRACTION AND ACCOMMODATION.

605. SCHMIDT-RIMPLER. **Remarks on the treatment of nearsightedness.** *Ophth. Klinik*, 1904, No. 16.

606. VOLLERT. **Mydriasis and accommodative paresis due to the entrance of a stramonium seed into the conjunctival sac.** *Klin. Monatsbl. f. Augenheilk.*, xlii., 2, p. 468.

607. DELAGÉ. **The correction of anisometropia.** *Arch. d'opht.*, xxiv., No. 12, p. 793.

608. ORLANDINI, O. **The relation of the lens to astigmatism.** *Annali di Ottalm.*, vol. x., 11, 1904.

SCHMIDT-RIMPLER (605) thinks the standpoint extreme, which requires myopes of only 0.75 D to wear a glass constantly; it is not generally understood that full correction, even in medium degrees of myopia, cause discomfort in persons with good vision and accommodation. Schmidt-Rimpler has become cautious in recommending Fukala's operation; he no longer removes the lens from the second eye, and believes that more highly myopic eyes are lost after the operation than without it.

VOLLERT'S (606) case is of general interest as the accident reported took place in a factory of artificial flowers in which the capsules of Datura stramonium were used as thistle-shaped calices to which the flowers were fastened. In opening the capsules one of the flower-girls was struck in the eye by a seed, with the result mentioned in the title. This accident is a warning, and shows the necessity of official regulation of the trades and occupations dealing with this poisonous plant.

DELAGÉ (607) advises full correction of anisometropia to restore binocular vision and prevent strabismus and amblyopia from non-use. The inequality of the retinal images is at first very disturbing, and there is diplopia, generally due to divergence, but these may be overcome by perseverance and exercises with Remy's diploscope. The lower grades of anisometropia are, strange as it may seem, harder to correct than the higher ones, but Delagé attained uniformly satisfactory results with willing patients. V. MITTELSTÄDT.

ORLANDINI (608) is of the opinion that there is no irregular contraction of the ciliary muscle in astigmatism, whether the latter be natural or artificially produced. CIRINCIONE.

VII.—MUSCLES AND NERVES.

609. BIELSCHOWSKY. **On the genesis of unilateral vertical movements of the eye.** *Zeitschr. f. Augenheilk.*, xii., 4, p. 545.

610. COHN, H. **On the inheritance and correction of convergent squint.** *Berl. klin. Wochenschr.*, 1904, No. 40, p. 1047.

611. BLOCH, E. **A case of abducens paralysis and paresis of the extremities after fracture of the skull.** *Neurol. Centralbl.*, 1904, No. 20, p. 940.

612. VOLLERT. **Paralysis of the right superior oblique with crossed facial hemi-paræsthesia, acquired cerebral nystagmus, and vertigo.** *Münch. med. Wochenschr.*, 1904, No. 45, p. 2001.

613. ROSENFELD, A. **Contribution to the symptomatology of paralysis of the sympathetic.** *Ibid.*, No. 46, p. 2039.

614. ROEMHELD, L. **On the tonic reaction of Argyll-Robertson pupils.** *Ibid.*, 1904, No. 46, p. 2041.

615. ZUR VERTH. **On the cortical centre for crossed turning of eyes and head.** *Mittheil. a. d. Grenzgeb. d. Med. u. Chir.*, xiv., 1 and 2, p. 195.

616. HAMILTON, ROBERT J. **Paralysis of the third nerve.** *Liverpool Med. and Chir. Journ.*, June, 1904.

617. HAMILL, S. M., and POSEY, W. C. **Associated movements of the head and eyes in infants.** *Am. Journ. Med. Sci.*, Nov., 1904.

618. POSEY, W. C. **Paralysis of upper movements of the eyes.** *Ann. of Ophth.*, July, 1904.

619. DUANE, A. **The precise measurement of the primary and secondary deviations in paralysis, with remarks on the regular occurrence of secondary deviation in congenital paralysis.** *Annals of Ophthal.*, Oct., 1904.

620. COLBURN, J. E. **Partial fixation of the eyeball for the improvement of vision in certain cases of nystagmus.** *Ophth. Record*, Aug., 1904.

621. WOOD, C. A. **Lipoma of the external rectus.** *Ibid.*, Sept., 1904.

622. COBURN, E. A. **Associated movements of jaw and upper lid.** *Med. Record*, Aug. 13, 1904.

623. POSEY, W. C., and LANGDON, H. M. **Observations on the non-operative treatment of squint.** *N. Y. Med. Journ.*, Dec. 10, 1904.

BIELSCHOWSKY (609) reports the case-histories of two cases representing varying types of strabismus sursumvergens. One patient can squint upward at will; while fixing with this eye, the other, under cover, deviates downward. In the other case there is no associated deviation of the covered eye downward, but an upward motion (alternating hyperphoria). In the latter case we have to deal, according to Bielschowsky, with an isolated innervation for sursumduction of the individual eye, originating in subordinate centres and inhibited when the function of fixation is assumed, so that there is no need of a permanent innervation for deorsumduction to keep the corresponding visual line in the horizontal plane.

COHN'S (610) data of 222 of his own cases show convergent

squint of the parents in 25 %, of the grandparents in 7 %, of brothers or sisters in 26 %, of uncles in 11 %, and of aunts in 12 %. In all congenital cases the squinting eye was hypermetropic. No sexual predisposition was apparent. Cohn advises correction of hypermetropia and the postponement of any operation until the tenth year, except in excessive degrees, when tenotomy can be done at six years.

BLOCH (611) reports the case of a laborer who was struck on the right side of the head by a falling beam. This was followed by paresis of the abducens and of the extremities on the right side, the former probably due to blood extravasation at the base of the skull after fracture of the pretrosum, the latter to a left-sided hemorrhage into the pons.

VOLLERT (612) observed in a woman of thirty-two years the symptom-complex reported in the title. A cure took place in the course of several weeks under potassium iodide. Vollert considers the cause of the affection to be, most probably, a gummatous infiltration on the right side in the region of the nucleus of the trochlear nerve.

ROSENFELD'S (613) patient had cancer of the œsophagus with lymph-gland metastases which, as autopsy showed, had "walled in" the right cervical sympathetic in the neighborhood of the lowest ganglion. Besides the usual symptoms of contracted pupil, narrowing of the lid-fissure, and anidrosis of the right side of the face, it was noted that the pupil on the paralyzed side showed a marked reaction to sensory stimulation of a painful nature, and that the opposite, *i. e.*, left, side of the face was always flushed and warmer than the right.

ROEMHELD (614) adds another case to those first described by Piltz. The patient, a man of forty-nine, had phthisis and exophthalmic goitre with reflex pupillary rigidity. Accommodation, convergence, and forced lid-closure produced brisk and maximum contraction, which persisted abnormally long and was followed by gradual dilatation, accompanied by transitional changes of form.

VERTH (615) reports the case of a miner who had had a head injury and suffered with attacks, beginning with convulsive movements of the eyes and head toward the right, followed by clonic facial spasm. After death from pneumonia, autopsy revealed a cicatrix at the upper part of the foot of the second frontal convolution. The centre for movements of the eyes and head toward the opposite side is to be found here.

HAMILTON'S (616) case here recorded is that of a girl aged twenty who, previous to the present affection, had never had a day's illness. For the last few months she had suffered from severe headaches, and the last attack was followed by paralysis of the third nerve. Another severe headache left her still worse, and a week later she had complete ophthalmoplegia externa and the left eye became blind.

The disk was grayish but not raised, and there was a gray halo round it with some œdema at the macula. The case assumed all the characteristics of a retrobulbar neuritis which might have been caused by thrombosis of the cavernous sinus, a tuberculous lesion, or a periostitis.

POSEY'S (618) patients had paralysis of movement upward in both eyes. In one case there was also complete paralysis of convergence and limitation of motility in other directions, particularly downward. In the second case motility was normal, except for movements upward. Posey assumes a lesion in the region of the corpora quadrigemina. ALLING.

COLBURN (620) sutures the external rectus to the outer wall of the orbit in cases of nystagmus and gets a diminution of the oscillations and improvement of vision. ALLING.

WOOD (621) classes lipomata originating in the fat cells within the muscle-sheath among the rarest of benign new-growths. He describes a tumor of this sort which developed in the fatty tissue of the capsule of the external rectus.

COBURN'S (622) case was one of complete ptosis, with raising of the upper lid when the mouth was opened. Similar cases are quoted from literature and arranged in appropriate groups. ALLING.

POSEY and LANGDON (623) devote their contribution principally to a criticism of Worth and his amblyoscope. After a study of a number of cases of squint, they find that the amblyoscope is of service in correcting the defect, especially if employed before the age of five years. It does not appear to them that the position of Worth which regards the primary cause of squint as central is sufficiently well established to refute the theory of Donders. The well-recognized fact that a certain amount of vertical deviation is commonly associated with convergent strabismus is touched upon. They agree with Worth as to the importance of correcting the refraction. ALLING.

BOOK REVIEWS.

The ophthalmological book-literature of this year is unusually rich. We can notice only a few at present.

TEXT-BOOKS.

I.—The **fourth edition** of Chas. H. May's **Manual of the Diseases of the Eye,** for students and general practitioners. William Wood and Co., New York, 1905. This small octavo volume has 391 pages, 360 original illustrations, including 21 plates with 60 colored pictures. Price, muslin, $2 net. This text-book is very popular and most available. The typography is clear and easily readable in spite of rather small letters.

The text is clear and terse, remarkably precise, always showing the author's endeavor and skill to do the subject justice, appealing to an intelligent and attentive reader. A feature of the book is the correct definition of words constantly used, and not always well understood, for instance in Chapter XX.: "Amblyopia and Functional Diseases of the Retina." For the indirect method of ophthalmoscopy the author recommends an objective lens of two inches' focus. This gives a large field, but small pictures. It is advisable to employ a lens of three inches' focus and even more, then, with a + 3 D or + 4 D lens behind the sight-hole of the mirror, we obtain an amplification almost as great as that obtained by the direct method. The indirect method, too much neglected in America, is of much more practical value than the direct: it is easier, gives a larger field, therefore a greater survey, and is far more expeditious than the direct method, which has the advantage if we want to closer examine particular details detected with the indirect method. The colored pictures in the book are good and decidedly a help to the student.

In regard to the peculiar disease, a milky halo around the red fovea in infants, first described by Mr. Tay of London, and which the neurologist, Dr. B. Sachs of New York, studied and called amaurotic family idiocy, ending always fatally in a year or two, and showing the inscrutable peculiarity that all recorded cases have been of Jewish parentage, the Reviewer can say that Dr. Mortimer Frank of Chicago, who has collected all recorded cases, showed him his compilation, which comprised seventy-two cases, of which six had been found among the gentiles in Chicago.

Chapter XX. is excellent: **Amblyopia and Functional Diseases of the Retina,** which traces the ray of light from the pupil through the eye, orbit, and the whole brain, describing the varieties of abnormalities in each part of this long, winding track as far as the memory centre, in the angular gyrus and supramarginal lobule, the degradation of which causes the word- and mind-blindness. This rather complicated subject is illustrated by three drawings, one in colors.

The optical part is well enough presented, with many drawings, from p. 251 to 317. One error should be expunged, as it is copied from Philadelphia treatises on refraction—for instance, no lesser authority than Thorington; on p. 307 there is the following, under the second diagram:

"The Direction of the Axis of a Cylinder is indicated by two systems: (1) the ordinary method (*i. e.* the clock method, generally used in America), by which the symmetrical meridians are designated with different numbers; (2) the *bisymmetrical method.*" He means the method prevalently used in Europe, and now more and more in America, which designates the vertical meridian of each eye with o°, and the symmetrical with the same numbers—for instance, 3° n, or 3° t, *i. e.* 3° nasal or 3° temporal. This is a symmetrical system and does justice to the very important condition of our eyes, namely, that the meridians of equal curvature have, as a rule, in both eyes the same position towards the *median plane of the body*, to which the vertical plane of the eye is parallel. There is, in the Reviewer's medical vocabulary, no such thing as bisymmetry. Our body has two sides: it is bilateral, but both its sides are the mirror pictures of its plane of symmetry, the median plane of the body. How far the single eye is symmetrical I know not. We know now that, as a rule, the meridians of both eyes are symmetrical to the median plane of the body, but I know not whether the symmetrical mer-

idians of the same eye have also the same curvatures: for instance, have the meridian 45° n and the meridian 45° t of the right eye the same curvatures? It would not be difficult to decide this question with the ophthalmometer.

A short chapter on the Disturbances of the Eye, and a shorter chapter, Ocular Therapeutics: General Rules for Eye Operations, and the familiar collyria, conclude this commendable text-book.

H. K.

II.—**The Commoner Diseases of the Eye, How to Detect and How to Treat Them.** For students of medicine. By CASEY A. WOOD, M.D., and THOS. A. WOODRUFF, M.D. Chicago, Ill.: C. P. Engelhard & Company, 1905.

This octavo of 491 pages and an index has the chief object to aid the general practitioner how to diagnose and treat the commoner affections of the eye which he should know in his work as the family health officer. It therefore lays stress on the methods of diagnosis and the treatment so far as he is competent enough to do his patient justice. The methods of diagnosis are minutely described and copiously illustrated. The book is not so much a condensed compendium, touching on all the details that are carefully described in systematic treatises, but more a **clinical guide-book** which instructs him how to find out all the symptoms of practical significance. The pathology and the course of the diseases are never omitted, neither is the treatment slighted. Such a book will supply an extensive real want, for the multitude of general physicians have not had the opportunity of making themselves proficient with modern ophthalmology, which is an important field in his responsible profession. The infant not rarely is threatened with a horrible eye affection which, until a decade ago, headed the statistics of blindness. The use of the ophthalmoscope, is for the practitioner as important as the stethoscope, in detecting the circulatory disturbances recognizable directly in the background of the eye, a small part of the brain which the genius of Helmholtz exposed to the physician's gaze in marvellous brilliancy. If the practitioner, for example, has learned to diagnose only arterio-sclerosis, he can avert in the majority of his patients the consequences of dangerous disease: apoplexy, Bright's, and others, by nothing more than correct diet and exercise. Also in the errors of refraction he can, by determining the proper spectacles, do an immeasurable benefit to countless

educated men and women, the skilled working-man, the genial artist, the far-sighted old age, which begins at forty-eight, etc.—even this knowledge would stamp the practitioner a guardian-angel of millions of people who otherwise would grope in darkness and misery. This need, that the family physician should have a fair knowledge of ophthalmology, has been felt by the authors as well as their Reviewer, who recommends this well-written and cleanly-printed, seasonable guide-book, which will delight him when he once has learned to tread securely the first steps. Each day he will conquer new territory. The eye, as a microcosmos, will interest him also as an object of science; he will first look into the eyes of his daughter's rabbit or dog, and into other animals with a tapetum, with their unimaginable brilliancy.

One of our English colleagues, Dr. G. Lindsay Johnson, a gifted fellow, somewhat eccentric, as genius mostly is, has used his free hours to go into the London "Zoo" and examine the background of lions, elephants, tigers, all kinds of monkeys, cats, bats, hedgehogs, hyenas, jackals, horses, etc. He drew them all, sometimes not without danger, perseveringly, in colors, and laid in this way the foundation of a new branch of medical science—comparative ophthalmoscopy. When the general practitioner in his spare hours has examined with the ophthalmoscope domestic animals, it will not only break the sometimes depressing monotony of his calling, but he may also try new remedies or new methods of operation, before he has to do it on his patients. Ophthalmology will present him a fruitful field to cultivate.

H. K.

III.—**The Principles of Refraction in the Human Eye, Based on the Laws of Conjugate Foci.** By SWAN M. BURNETT, M.D., Ph.D.

This is an elaborate and well-digested essay on the fundamental law of refraction, published two years ago in the *American Journal of Ophthalmology*, and last year by that celebrated optical company, The Keystone, Nineteenth and Brown Streets, Philadelphia; 67 pages in 8°, nicely printed with many figures. Dr. Burnett passes review on the various subjects which the ophthalmologist needs, in a strictly scientific way. It is an analysis of the extended field in which the oculist must work. It will benefit the reader to follow the author, with pencil in

hand, and solve the physical problems for himself. It will require a certain mental effort, not too intricate, except in the chapter on skiascopy. He will find many problems which are frequently too much mystified, based on this dominant principle, the familiarity of which will aid him greatly in study and practice.

H. K.

IV.—**Errors of Refraction and Their Treatment: A Clinical Pocket-Book for Practitioners and Students.** By CHAS. BLAIR, M.D., Ophthalmic Surgeon to the Western Ophthalmic Hospital, London, etc. Bristol: John White & Co., 1905.

A very well-printed duodecimo of 100 pages. It goes carefully over the whole field of practical refraction. In the ametropia, combined with errors of motion, he, in our opinion, refers too much to prisms and tenotomy instead of correcting the full ametropia, and if this is not tolerated at once, it may be obtained gradually. He says, however, concisely and correctly (p. 25): "In H. accommodation is always in excess of convergence, and in M. convergence is in excess of accommodation." He says (p. 28): "In anisometropia the patient is particularly liable to suffer from asthenopia." Further (p. 29): "Muscular asthenopia is the common cause of headaches in myopia; accommodative asthenopia is due to the muscles of convergence. The third variety is retinal or nervous asthenopia." In this the Reviewer thinks that in a great number of the cases the cause is arterio-sclerosis, which occurs also in young people. The treatment of this variety is diet and exercise. The diagnosis, especially in patients beyond forty, is made with the ophthalmoscope, where the arteries are relatively too narrow. Our little book goes over the whole field. An attentive reader will peruse it with profit and satisfaction. The initial chapter at the first half is recapitulated in the manner of a *practical guide-book*, where the procedures of diagnosis, operations, spectacle formulæ, and prescriptions, especially in astigmatism, are carefully described. In every important condition the student is taught by examples. The problem is given, the student tries to solve it; when he is through he compares it with that of the book.

This small treatise can be heartily recommended to the student and as a review for the adept, as these subjects in their variety are easily forgotten.

H. K.

V.—**Diseases of the Eye and Ear:** A Manual for Students and Practitioners. By ARTHUR N. ALLING, M.D., Clinical Professor of Ophthalmology in the Yale University, and OVIDUS ARTHUR GRIFFIN, B.S., M.D., late Oculist and Aurist, University, Ann Arbor, Mich. Published in the *Medical Epitome* Series, edited by Victor Cox Pedersen. Lea Bros. & Co., Philadelphia and New York, 1905. The ophthalmic part of this duodecimo volume occupies 142 pages; the aural, 103. Price $1.

The whole book is printed in small but very clear type, and it is remarkable how much reading matter the authors present to their readers. Chapter I. deals with the examination of the eye and its appendages: lachrymal apparatus; lids, the commoner diseases, trichiasis, distichiasis, inner and outer surface by inspecting it everted; Desmarres' lid retractor is illustrated. The external parts with their diseases are tersely described. Oblique illumination is used for cornea; anterior chamber, iris, pupil, lens, vitreous humor, are elucidated, even the anterior part of the vitreous. Orbit and its contents, walls, and its diseases; the eyeball itself, its correct position; exophthalmos and enophthalmos, megalophthalmos and microphthalmos. The examination of the interior parts of the eye is chiefly done with the ophthalmoscope; with a woodcut of Loring's small ophthalmoscope. The use of the ophthalmoscope is described. Tension + and − is explained.

The next department is the functional examination: Acuteness of vision, according to Snellen; accommodation, field of vision, with perimeter, the normal extent of the light and color fields are illustrated, also Förster's perimeter. On page 31, and after every subsequent chapter, some questions are given. Chapter II.: Diseases of the lachrymal apparatus, gland (secreting), lachrymal sac and ducts, abscess of sac. Chapter III.: The diseases of the lids are given a good deal of space—inflammation, diffuse and partial, hordeolum, phthiriasis, epicanthus, and coloboma of lids, tumors, etc.

The importance of the diseases of the conjunctiva is recognized; the author gives them fifteen pages. Eleven pages are devoted to the cornea. The diseases of the sclera and iris are carefully described.

The physiology of the pupil receives a great deal of scientific exposition, showing its importance. Myosis and mydriasis give valuable symptoms as to the diagnosis of the affections of the head, the nervous system, and some special diseases, *e.g.*, locomotor ataxia.

The ciliary body is inadequately described; one and a quarter pages only.

The chapter on the lens (XX.) is presented with considerable detail: first, anterior and posterior polar cataract; zonular or lamellar cataract; senile cataract, the chief degeneration of sight in old age; combined and simple extraction, and dealing with the after-cataract, *i. e.*, capsule and frequently remains of cortex. Lenticonus, anterior and posterior, is mentioned.

Vitreous: its floating opacities and purulent inflammation, culminating in panophthalmitis, are shortly described.

Retinal diseases: its inflammation, embolism or plugging of the central retinal artery, detachment of retina, glioma (one page), well described four stages: first, shining white reflex (amaurotic cat's eye of the late Professor Beer in Vienna), a degeneration of the retina; second stage fills and hardens the eyeball; third stage, perforation and expansion of globe; fourth, metastatic growths, rare, only few in the cancellous layer of flat bones (Reviewer).

Rarer forms of retinal disease: Retinitis proliferans. Retinitis circinata, white ring around the limits of the macular region, (origin is mostly hemorrhage in retina by endarteritic processes in the macular vessels (Reviewer). Retinitis striata. Angioid streaks: black or brown striæ in deeper layers, originally hemorrhagic.

Amaurotic family idiocy (B. Sachs), discovered by Tay, London, who gives a very good ophthalmoscopic picture: the fovea red, surrounded by a gray halo (first volume of the *Trans. of the Ophth. Soc. of the United Kingdom*). Amblyopia and functional disease of the retina, here the condensation of the books, also others of the same calibre, show the impossibility to do justice to the subject and the young reader.

Congenital, hysterical, simulated, and toxic amblyopias; of course it is correct to mention these conditions, so that the thorough student may know where more information is needed.

The diseases of the choroid, optic neuritis, acute retrobulbar neuritis. A goodly number of important diseases are only briefly mentioned; the explanations are, however, to the point. Glaucoma, sympathetic ophthalmia, sympathetic irritations, are seriously considered. Refraction is to be learned on eight pages, and the muscles and nerves of the eye on eight pages, also the operations and the determination of ametropia, astigmatism, principally the use of the shadow test.

The book is clear in type and diction, and touches on the most important subjects. The proper reader is the student, who has made himself familiar with the subject and listened when the professor, all theoretical, demonstrates the disease, diagnosis, and treatment, on the patient. Such books have a place in ophthalmic literature: for the beginner in ophthalmology and otology. The aural part is an even partner of the ophthalmic.

H. K

VI.—**Refraction and How to Refract,** including Sections on Optics, Retinoscopy, the Fitting of Spectacles and Eyeglasses, etc. By JAS. THORINGTON, A.M., M.D. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. Third edition, 1905.

This popular guide-book deserves its favor. It is well gotten up, very clear, with clean illustrations, explains everything needful: reflection, refraction, prisms and their position and action; angle of deviation, effect and methods to measure them; refracting angle, Prentice's prism-dioptry, Dennett's method; the unit or centrad (V) is a prism that will deviate the ray of light $\frac{1}{100}$ part of the arc of the radian; the radian equals 25.295°. The arc of the radian is then divided into 100 parts. The book gives a table of centrads and prism-diopters, comparing them with refracting angles. Up to 20° the three methods differ little. After that they differ considerably, especially the prism-dioptry. The refracting angle is still most in use; the two others lend themselves better to the consideration of some special subjects.

The examination of ametropia is clear, that of astigmic eyes with spectacle glasses is as a rule not very difficult. Combining spheres or cylinders is only addition and subtraction. The author shows this by many examples. The spectacle formulas are very clear, and mostly printed in heavy type—for example, at top of page 50

$+ 2$ cyl. axis 75 $\supset$ $+ 3$ cyl. axis 165, will equal $2 \supset + 1$ cyl. axis 165

would be understood in all America, and also by a simpler notation: $+ 2^{c}\ 75° + 3^{c}\ 165°$, equally well to be understood as $+ 2 + 1^{\ c}\ 165°$.

The old sign of Donders $\supset$ is superfluous. It needs only to put down the sums as they are; it is easier also for the printer. The optician will put before the glass + or −; s as "spherical" is also superfluous; for a cylinder there is a + or − sign, with ^{c} above, as $+ 3^{c}\ 90°$. The ° above indicates the degree of the axis of the cyl.

Next follows the consideration of the standard eye, the car-

dinal points, the visual angle, to determine the visual acuteness, according to Snellen. There are + and − spheres, + and − cylinders and their angles, which the student must handle again and again until he can do it as easily as ordinary sums.

In regard to the theory of accommodation, Helmholtz's explanation of its mechanism stands still in the foreground; some small additions are made. One of the most curious is the fact, discovered by C. Hess, that in positive accommodation the nucleus sinks a little.

The mechanism of the accommodation, and its optical value may be found by determining the proximate and remote point, of sight, as ordinarily; or by determining the changes in the cardinal points, which is very difficult and laborious. The Reviewer has done it in his student days, in Helmholtz's laboratory. It took six months; the cardinal points, the curvature of cornea, the depth of anterior chamber, and the radius of the anterior lens capsule had to be determined in tension and relaxation, and also the locus of the anterior lens surface. I did that on four living eyes, whose amplitude of accommodation was determined clinically with glasses, and physically with the Helmholtz's ophthalmometer. The experiments and the calculations were rather complicated, but the ranges of accommodation, functionally and physically determined, were remarkably the same.[1]

On page 87, the author writes: "The cornea resembles, in its central area at least, an ellipsoid of revolution." This is not exact; if it were an ellipsoid of revolution, all the meridians would have the same curvature. The difference of curvature of the meridians is the cause of astigmatism.[2]

Chapter III.: Ophthalmoscope; the description of the instrument, and the rules of using it are well described, as are all the other procedures.

Chapter IV.: Emmetropia, Hyperopia, Myopia.

Then Chapter V.: Astigmatism; rather meagre description, not adequate to the importance of the imperfection of the outer surface of the cornea. The American system (clock-dial system) is not particularly adapted to immediately showing the symmetry or asymmetry. It designates the meridians in about 90 % of equal, or nearly equal, curvature. Its 45° on the left eye finds

[1] Confer. Dr. J. H. KNAPP: "Über die Lage u. Krümmung des Oberflächen der menschlichen Linse u. den Einfluss ihrer Veränderungen bei der Accommodation auf die Dioptrik des Auges." *Graefe's Archiv*, vi., 2, pp. 1–52,

[2] See *Die Krümmung der Hornhaut des menschlichen Auges*, von Dr. J. H. Knapp. Heidelberg: J. C. B. Mohr, 1859.

its partner at 135° in the other eye. The European mode shows the symmetry at once, but it requires a letter, 45° n, 45° t (45 nasal, 45 temporal).

The diagnosis of Astigmia is very elaborate, from the ordinary disk, like a watch-face, to the Javal ophthalmometer and retinoscopy; the latter, the best test, is described very carefully.

Chapter VII. describes the examination of the external eye muscles. It is elementary.

Chapter VIII. : Cycloplegics, Asthenopia, Examination of the Eyes. He cautions in relation to scopolamin hydrochlorate, gr. 1 : $\frac{5}{3}\frac{1}{2}$ (1:250). Only two drops, half hour apart, are necessary; half hour apart suffices to produce the static refraction after one hour after the last drop.

Under Cramp of the Ciliary Muscle he describes spasm of accommodation, with symptoms : "opera headache [p. 219], train headache, shopper's headache, bargain-counter headache." I can increase this train of symptoms: nervousness, amblyopia, concentric contraction of visual field, sometimes hyperæmia of odd or of the adjacent retina, but mostly still in the normal latitude. This complex of symptoms is well enough known. I have seen it often in Germany, where it is known under the name, Neurasthenia with concentric contraction of F. Forty years ago there was a good deal of literature on this weakness. These patients are cured by correcting their ametropia, if they have any, and to tell them "This is an eye-fainting "; or something like: "You need not mind it; go to school and have a good time, only do not over-eat." The marked history of this disease may here find a few words.[1]

The remainder of the book is devoted to the solution of problems. I mean cases with incident symptoms, which the student has to analyze, and write the results on paper, chiefly formulas for astigmic ametropia-drilling. H. K.

[1] A healthy girl, of Baltimore, was brought to me by her (wealthy) parents. She had the symptoms, the concentric contraction, etc., marked; the vessels of the background were well filled. She had had three weeks' prison in bed. S $\frac{4}{10}$. I told the parents to give that child liberty, keep her straight in eating, see that she does not lose sleep. Six weeks later, the parents brought her again, reporting that the child had not complained any more for five weeks, but then the old condition recurred. I examined her; the functional and ophthalmoscopic symptoms the same. It was in February. I told them: "Try to get three opera tickets this night. You take her to the opera." The opera was *Siegfried*. She had a place in the parquette, and I had a place not far from her. That girl was all attention and glow. They stayed until the end, which was at one o'clock. The next morning, at 11, they all came radiant. I let her read the test types; before she read $\frac{4}{10}$, now she read $\frac{4}{5}$ fluently. I told them: "When there is a relapse again, you know the remedy, but you may do better: prevention; this means, put on her daily programme one or two hours of real pleasure."

INVITATION TO COLLECTING INVESTIGATION ON ALBINISM.

We are asked to state that an investigation as to the *Heredity of Albinism in Man* is being carried out by Professor Karl Pearson, F. R. S., of University College, London (England), with the co-operation of Mr. E. Nettleship (Shottermill, Surrey, England), and Dr. E. Stainer (Physician to the Skin Department, St. Thomas's Hospital), 60, Wimpole Street, W., London (England), and that cases bearing on the subject, *either positively or negatively*, will be very thankfully received by any of those gentlemen. The investigators desire to collect a large series of examples of Albinism,—complete or incomplete, general or partial,—in which the family history of the albino patient can be traced for one, two, three, or more generations. The sex and prevalent color of eyes and hair in as many of the patient's relations and ancestors as possible should also be noted, whether any of them are albinotic or not; also all instances of consanguineous marriage. Cases of Albinism of the eyes in persons with congenitally pied skin (most easily recognized in dark races) will also be very valuable even without family history,—acquired leukoderma being of course excluded. Reports are welcome now, or months later; direct to Prof. Karl Pearson, Univ., London, or to one of the other names.

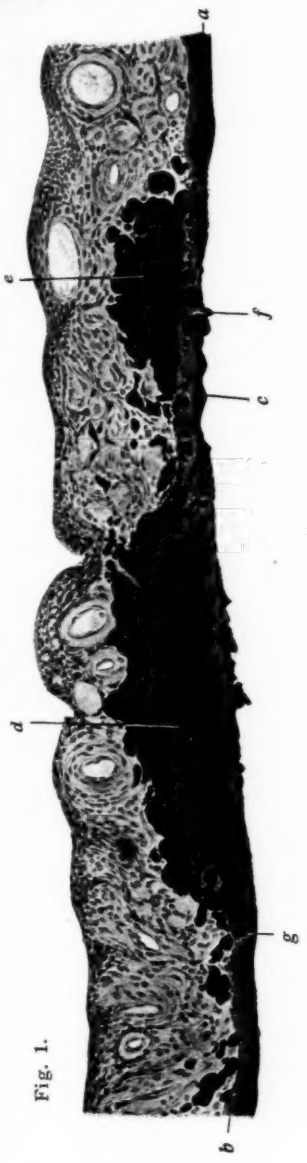


Fig. 1.

Fig. 2.

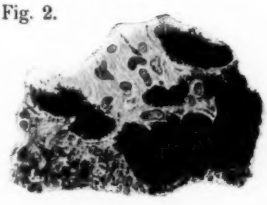
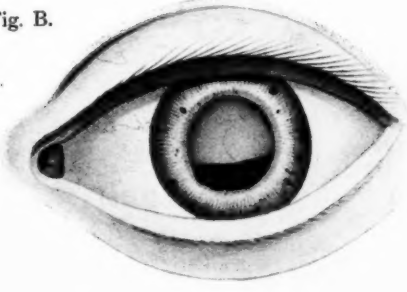


Fig. 3.

Fig. A.

Fig. B.



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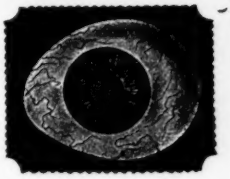

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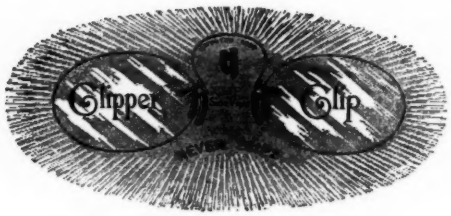

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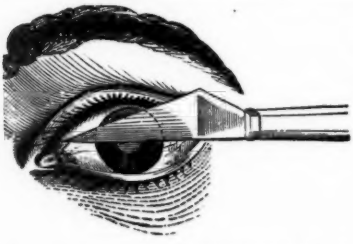

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